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# FRONTISPIECE.



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## EXPLANATION

*The Genius of Universal Literature conducting the Authors of this Work (represented by Learning & Experimental Philosophy) to the Temple of Wisdom, in which are deposited all the materials requisite for composing a New and Complete Dictionary of Arts and Sciences upon an improved Plan.*



# THE NEW COMPLETE DICTIONARY OF ARTS AND SCIENCES;

OR,  
AN UNIVERSAL SYSTEM OF USEFUL KNOWLEDGE.

CONTAINING

A full Explanation of every ART and SCIENCE, whether LIBERAL or MECHANICAL, in which the Difficulties attending a THOROUGH KNOWLEDGE of them are clearly pointed out, and such Directions given as cannot fail of making their Acquisition easy and familiar to every Capacity. Exhibiting, among the various other BRANCHES of LITERATURE, a copious Elucidation of the following, viz.

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ANATOMY,	DIALING,	HERALDRY,	MECHANICKS,	PHILOSOPHY,
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MDCCLXXVIII.





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# P R E F A C E.

**I**F to be wise is to be happy : How very defireable must those Means be, that have a manifest Tendency to facilitate our Pursuits after Wisdom ; because they bring us to Happiness ! But of all the Ways that lead to this great End, next to the Sacred Pages, we may venture to aver, that the Study of the *Arts* and *Sciences* is the foremost. It is in Degree as this Study prevails, that any Nation is civilized, the human Faculties enlarged, the Manners of Mankind polished, and the most happy beneficial Correspondence between the various Members of Society throughout the World established.

What seems peculiarly discouraging to many is, 1. That the different Terms and various Systems of *Arts* and *Sciences* are scattered throughout a vast Multitude of Books — 2. That to purchase these Books is attended with a very considerable Expence — 3. That even where there is an Inclination there is often a Want of Time to study them — 4. And, that as it is now almost an universal Custom for every Nation to publish in their own Tongue, the Student is under a Necessity of learning four or five different Languages, before he can make any considerable Progress.

It is with a View to remove these great Hinderances, and to make the Path of Knowledge smooth and easy, that a Number of Gentlemen have engaged in this arduous Undertaking of *The New Complete Dictionary of Arts and Sciences* ; each Member employed in executing the Part which he has hitherto made his principal Study ; and consequently not only capable of communicating to the Publick, with Taste and Genius, what the Moderns and Ancients have written on the same Subject, but also of adding thereto his own Improvements and Discoveries.

In order to afford every possible Encouragement, these Gentlemen have labored to render this inestimable Work of as easy Purchase as they could, by lopping off every Thing superfluous, and at the same Time studiously preserving every profitable and interesting Article. They have also concluded, that many singular Advantages will accrue from its being published periodically ; viz. That the Expence is scarcely if at all felt — That an Hour's Reading in a Day, or at an Evening, will complete the Number in the Course of the Week — And that it will entertain as well as refresh the Memories of those who formerly made the *Arts* and *Sciences* their Study ; and by the Time the Num-  
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bers are all out, he who was at first, in some Measure, a Stranger in this Circle of human Literature, is most pleasingly, because imperceptibly, brought to a general Knowledge of it; and a Work by him, to which, at his Leisure, he may refer for the obtaining a critical Knowledge of those Branches his particular Turn of Mind leads him to.

It is but too common in Addresses to the Publick, for Gentlemen to set off their own Performances by depreciating all others: However, we think ourselves under no such ungenerous Necessity. For allowing the Merit due to all who have been before us, we doubt not, but it will be deemed a sufficient Apology for our new Publication to observe, That great Improvements have been lately made in almost every Branch of Learning, and that since the Society for the Encouragement of Arts, Sciences, Manufactures, and Commerce, has been instituted, and large Premiums given by that most ingenious and generous Body; a great Number of Discoveries in various useful Arts have been made, and many curious Machines constructed, Models of which are in the Possession of the Society for the Benefit of Mankind. And that at the same Time we can say, This is the cheapest, we flatter ourselves, as no Labor or Expence has been spared, that it will also be judged the best Work of the Kind in the English Language.

# T H E

## N E W C O M P L E T E

# D I C T I O N A R Y

### O F

## A R T S A N D S C I E N C E S.

A B A

A B A

**A,** This character is the first letter, as well as the first vowel, in the alphabets of all the modern, and most of the ancient, languages; and in English has three different sounds, viz. short, as in *cat, hat, what, &c.* long, as in *knave, hate, &c.* and broad, as in *walk, call, &c.* It is with the greatest propriety placed first in the alphabet on account of its simplicity, very little more being necessary to its pronunciation than opening the mouth.

A, is an abbreviation, as A. D. for *anno domini*, A. M. *artium magister*, master of arts, &c. Among logicians it is used to denote an universal affirmative proposition.

A, is the first of the dominical letters in the Julian Calendar; and was anciently a numeral letter, and signified 500; and with a dash on the top,  $\bar{A}$ , stood for 5000.

A. A. A. among chemists, signifies an amalgam, or the mixture of any other metal with quicksilver.

A,  $\bar{a}$ , or  $\bar{a}\bar{a}$ , in physic, is an abbreviation of *ana*; which being never used but after the mention of two or more ingredients, implies that they should be taken in quantities of equal weight or measure, to form the composition wherein they occur. The word *ana* stands for *ἄνα μέρους*, signifying *separately*, or *of each by itself*.

AABAM, a term used by some alchymists to signify lead.

AAM, or HAAM, a Dutch measure for liquids, containing about sixty-three pounds avoirdupois weight.

AB, The fifth of the sacred, and the eleventh month of the civil year of the Hebrews. It corresponds to part of our June and July, and consists of thirty days. On the first of this month the Jews commemorate the death of Aaron by a fast; and also the ninth, because on that day both the temple of Solomon and that erected after the captivity were burnt. The same day is also remarkable for the publication of Adrian's edict, prohibiting the Jews to look back, even at a distance, upon Jerusalem, or to lament its desolation. The lamp of the sanctuary, in the time of Ahaz, was extinguished on the night of the eighteenth, for which reason the Jews fast that day. It is the name of the last summer month of the year, in the Syriac calendar.

ABACK, from *abigor*, driven away by force, is a sea term, used to signify that the sails are flatted close to the masts by the violence of the wind.

When the sailers want to effect an immediate retreat, without turning to the right or left, they bring the sails into this situation, by slackening their lee braces, and hauling in the weather ones; by which means the whole force of the wind is exerted on the fore part of their surface, and wholly tends to push the ship astern. So that when either by the ship's course, or by a sudden alteration of the wind, the sails are put into this form, they are said to be aback.

VOL. I. No. 1.

It is usual to spread the mizzen top-sail, or some other near the stern, *aback*, in order to prevent a ship, riding with a single anchor in a road, from approaching it by the motion of the tide, otherwise it would loosen the anchor by entangling the flukes with their slackened cable.

ABACO, a word the ancients use, and signifies arithmetic: It is still in use with the Italians, and implies that science.

ABACOT, the name of an ancient cap of state, worn by the kings of England: the upper part of it formed a double crown.

ABACTORS, or ABACTORES, it is of Latin derivation, from *abigo*, compounded of *ab*, from, or away, and *ago*, to drive; a name given to those who drive away, or rather steal cattle by herds, or great numbers at once; and are therefore very properly distinguished from fures, or thieves, who take only two or three at a time.

ABACUS, among the ancients, was a kind of cupboard, or buffet. The word is Latin, but formed from the Greek  $\alpha\beta\alpha\kappa\acute{\iota}$ , which among that people signified the same thing; which some suppose to be compounded of  $\alpha$  privative, and  $\beta\alpha\sigma\iota\varsigma$ , foundation; and so had no frame or foot, but was fastened some way to the wall. Guichart, who derives  $\alpha\beta\alpha\kappa\acute{\iota}$ , from the Hebrew  $\text{אֲבַחַךְ}$ , *extolli*, to be elevated, or raised, supposes its primary signification to be a high shelf, or similar convenience. In this sense, Livy describing the luxury into which the Romans degenerated after the conquest of Asia, says, they had their *Abaci*, beds, &c. placed over with gold. Dec. IV. Lib. ix.

ABACUS was particularly used among the mathematicians, for a little table strewed over with dust, on which they drew their schemes and figures. In this sense, the word seems formed from the Phœnician  $\text{אֲבַחַךְ}$ , *aback*, dust.

ABACUS *Pythagoricus*, a table of numbers, contrived for the ready learning of the principles of arithmetic; denominated *Pythagoricus*, from its inventor *Pythagoras*: and was, probably, no other than what we call multiplication table. See ARITHMETIC.

ABACUS, in architecture, is the uppermost member of the capital of a column; serving as a kind of crowning, both to the capital and the whole column.

Vitruvius, and others after him, who give the history of the orders, tell us, the *Abacus* was originally intended to represent a square tile laid over an urn, or rather over a basket. An Athenian old woman happening to place a basket, thus covered, over the root of an acanthus; that plant shooting up the following spring, encompassed the basket all around, till meeting with the tile, it curled back in a kind of scrolls. An ingenious sculptor passing by, took the hint, and immediately executed a capital on this plan; represent-

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ing the tile by the *Abacus*, the leaves by the volutes, and the basket by the vase, or body of the capital. Such was the origin of the first regular order.

The *Abacus* varies in different orders. In the Tuscan, Doric, and ancient Ionic; it is a flat, square member, well enough representing its original tile: but in the richer orders it loses its native form; its four sides, or faces, being arched, or cut inwards, with some ornament, as a rose, or other flower, or fishes tail in the middle of each arch.

ABACUS is also used by Scammozzi for a concave moulding in the capital of the Tuscan pedestal.

ABADDON, a name given by St. John in the Revelations, to the king of Locusts. It is derived from *abad*, to destroy.

ABADIR, a word composed of two Phœnician terms, signifying magnificent father, a title which the Carthaginians gave to gods of the first order. In mythology, it is the name of a stone, which Saturn swallowed, from a persuasion that it was his infant son Jupiter.

ABAST, is a sea term, used in speaking of things placed, or done, toward the stern, or hinder-part of the vessel; called also *ast*, and stands opposed to *fore*. Thus they say a thing is *abast* the foremast, when it is behind it, or nearer the stern than the foremast is. The post of the master, captain, and other officers, is *abast* the mainmast. The stern, strictly speaking, is only the outside; *abast* includes both inside and out.

ABAPTISTON, or ANABAPTISTON, is derived from *a* priv. and *βαπτω*, to plunge, a name anciently given to an instrument in chirurgery, by modern writers more usually called *trepan*, *modiolus*, *terebra*, *terebellum* and *trafine*.

ABARTICULATION, in anatomy, the same with diarthrosis. See the article DIARTHROSIS.

ABAS, a weight used by the Persian merchants in weighing pearls. It is one eighth less than the European caratt.

ABASED, or ABAISSE, in heraldry, is applied to the vol, or wings of eagles, &c. when the tip, or angle, looks downward toward the point of the shield; or when the wings are shut; the natural way of bearing them being spread, with the tip pointing to the chief, or the angles.

A chevron, a pale, bend, &c. are also said to be *abased*, when their points terminate in, or below, the centre of the shield. An ordinary is said to be *abased*, when below its due situation: Thus the commanders of the order of Malta, who have chiefs in their own arms, are obliged to abase them under those of religion.

ABATEMENT in law, is used for the frustrating, or setting aside a suit, on account of some fault either in the matter, or proceeding thereof. It also denotes an irregular entry upon lands, or tenements, left vacant by their possessor, and not yet laid hold of by the next heir. As he that puts out the possessor is said to dispossess; so he that interposes, or steps in between the former possessor and his heir, is said to *abate*.

ABATEMENT, in heraldry, something added to a coat-armour, to diminish its proper value and dignity, and note some dishonourable action or stain in the character of the person who bears it.

ABB, among clothiers, signifies the yarn of a weaver's warp.

ABBESS, the superior of an abbey, or convent of nuns, who enjoys the same privileges over them as the abbots over their monks, except in performing the spiritual offices of the priesthood.

F. Martene, in his treatise of the rites of the church, observes, that some *Abbesses* have formerly confessed their nuns: but he adds, that their excessive curiosity carried them such lengths, that there arose a necessity of checking it. But there are instances of some *Abbesses*, who have the privilege to commission a priest to act for them.

ABBEY, or ABBY, a religious house, or monastery, governed by a superior under the title of abbot, or Abbess.

Fauchet observes, that, in the early days of the French monarchy, dukes and counts were called abbots,

and duchies and counties *Abbeys*. One third of the best benefices in England were antiently, by the Pope's grant, appropriated to *Abbeys* and other religious houses; which upon their dissolution under King Henry VIII. became lay-fee: one hundred and ninety such were dissolved of between 200 l. and 35000 l. yearly revenue, which, at a medium, amounted to 2853000 l. per annum.

ABBOT, the head of a monastery of monks erected into an abbey or prelacy.

The name *Abbot* is originally Hebrew, where it signifies father. The governors of the primitive monasteries assumed indifferently, the titles *Abbot*, and Archimandrite.

There were among the ancient *Abbots* several persons of learning, who made vigorous opposition to the rising heresies of those times; which first occasioned the bishops to call them out of their deserts, and fix them about the suburbs of cities, and at length in the cities themselves; from which epoch their degeneracy is to be dated.

The *Abbots*, now, soon wore off their former plainness and simplicity, and began to be looked on as a sort of little prelates. In time they would be independent of the bishops, and became so insupportable, that some severe laws were made against them at the council of Chalcedon: notwithstanding this, in time, many of them carried the point of independency, and got the appellation of lord, with other badges of the episcopate, particularly the mitre. Hence arose new species and distinctions of *Abbots*; mitred, and not mitred; croized, and not croized; œcumenical *Abbots*, cardinal *Abbots*, &c.

ABBREVIATURE, or ABBREVIATION; implies the substitution of a syllable, letter, or character, for a whole word. It is derived from *abbrevio*, to shorten.

ABBREVOIR, is French, and literally denotes a watering-place; in masonry it signifies the joint, or juncture of two stones; or the interstice or space left between them, and filled up with mortar.

ABBUTTALS, ABUTTALS, or *Abutals*, among law-writers, denote the buttings or boundings of a piece of land; expressing on what other lands, highways, or the like, the several extremes thereof do *abut*, or terminate.

ABCEDARY, or ABCEDARIAN, is sometimes applied to compositions whose parts are disposed in the order of the letters of the alphabet; and in this sense is synonymous with alphabetical.

Thus we meet with *abecedarian* psalms, lamentations, prayers, and the like; chiefly among Hebrew writers; which makes it probable they were the inventors of this species of wit.

ABDEST, a term used for the legal purifications by water, practised among the Mahometans and Persians before they begin their religious ceremonies.

ABDICATION, the action of renouncing or giving up an office; and is frequently confounded with resignation; but strictly speaking, there is a difference: *abdication* being done purely and simply; whereas resignation is done in favour of some third person.

In this sense, Dioclesian, and Charles V. are said to have abdicated the crown; but Philip IV. of Spain resigned it. The parliament voted king James's violation of the laws, and his quitting the kingdom, without providing for the due administration of affairs in his absence, to import an abdication of the crown.

ABDICATION, among Roman writers, is more particularly used for the act whereby a father disclaimed or disclaimed his son, and expelled him the family.

ABDOMEN, from *abdo*, to hide, in anatomy, a cavity containing many of the principal parts of the human body. It is commonly called the lower venter, or belly. It contains the stomach, guts, liver, spleen, bladder, &c. and is within lined with a membrane called the peritonæum. The lower part is called the hypogastrium; the foremost part is divided into epygastrium, the right and left hypochondria, and the navel. It is bounded above by the cartilago-enfiformis, and the diaphragm, sideways by the short or lower ribs, and behind by the vertebræ of the loins, the



the bones of the coxendix, that of the pubes, and os sacrum. It is covered with several muscles, from whose alternate relaxations and contractions in respiration, digestion is forwarded, and the due motion of all the parts therein contained, promoted both for secretion and expulsion. Diseases of the ABDOMEN are chiefly inflammations, abscesses, indurations, inflations, spasms, &c.

ABDUCTION, in logic, a form of reasoning, called by the Greeks *απαγωγή*; wherein, from a certain or undeniable proposition, we infer the truth of something supposed to be contained in that proposition: thus in this syllogism,

Whatever God has revealed is certainly true:

Now, God has revealed the mysteries of the incarnation and trinity:

Therefore, these mysteries are certainly true.

In arguments of this kind, it is always necessary to prove the minor proposition to be contained in the major, or undeniable one, otherwise the reasoning loses all its force.

ABDUCTION, in surgery, a species of fracture, wherein the broken parts of the bone recede from each other.

ABDUCTORS, in anatomy, the name of several muscles which serve to open or draw back the parts to which they are fixed. See MUSCLES OF THE HUMAN BODY.

ABELE-TREE, in botany, an obsolete name for a species of the poplar. It may be advantageously planted in boggy places, where few other trees will thrive; for it delights in moorish land, where it will grow to a great height in a few years.

ABELIANS, or *Abelaites*, a sect of heretics, probably so called, for no other reason, but because *Abel* had no issue; not that he lived in continence after marriage; but because he was killed before marriage. They sprung up in Africa, not far from Hippo. And their distinguishing tenet was to marry, and yet to live with their wives without having any carnal commerce with them; a tenet, which, according to authors, they founded on that text, 1 Cor. vii. 29. *Let them that have wives be as though they had none.*

ABERRATION of the stars, a small apparent motion of the fixed stars discovered by the late Dr. Bradley.

The word is Latin, and compounded of *ab*, from, and *erro*, to wander, because the stars appear to wander, from their true situation.

The way this important discovery was first made, was in the following remarkable manner. In the year 1725, when Mr. Molyneux and Dr. Bradley began to observe the bright star in the head of *Draco*, marked  $\gamma$  by Bayer, as it passed near the zenith, with an instrument made by Mr. Graham, in order to discover the parallax of the earth's annual orbit, and after repeated observations they found this star, about the beginning of March 1726, to be 20" more southerly than at the time of the first observation. It now indeed seemed to have arrived at its utmost limit southward; because, in several trials made about this time, no sensible difference was observed in its situation. By the middle of April it appeared to be returning back again toward the north, and about the beginning of June it passed at the same distance from the zenith as it had done in December, when it was first observed; in September following it appeared 39" more northerly than it was in March, just the contrary way to what it ought to appear by the annual parallax of the stars.

This unexpected phenomenon perplexed the observers very much; and Mr. Molyneux died before the true cause of it was discovered. After this, Dr. Bradley, with another instrument more exact and accurately adapted to this purpose, observed the same appearances not only in that but in many other stars; and, by the great regularity that appeared in a series of observations made in all parts of the year, the doctor was fully satisfied with regard to the general laws of the phenomena; and therefore endeavoured to find out the cause of them. He was already convinced that the apparent motion of the stars was not owing to a nutation of the earth's axis.

The next thing that offered itself, was an alteration in the direction of the plumb line, with which the instrument was constantly rectified; but this, upon trial, proved insufficient. Then he had recourse to what refraction might do, but here also nothing satisfactory occurred. At last, through a most amazing sagacity, this acute astronomer conjectured, that all the phenomena, hitherto mentioned, proceeded from the progressive motion of light, and the earth's annual motion in its orbit: for he perceived, that if light was propagated in time, the apparent place of a fixed object would not be the same when the eye is at rest, as when it is moving in any other direction, than that of the line passing through the eye and object; and that, when the eye is moving in different directions, the apparent place of the object would be different.

For a full illustration of this noble discovery, see (plate I. fig. 3.) where S is supposed to represent the sun; ABCD the earth's orbit; and from S, suppose a perpendicular erected, as SP, passing through the star at P. Now, if the spectator were at S, he would always view the star in the same perpendicular direction, and in its true place at P, projected into the point *p* in the visible surface of the heavens. But, if the spectator be carried about the sun in the circle ABCD, whose diameter is not insensible at the distance P, or subtends a sensible angle APC; then, in the position A, he will see the star P in the right line AP*a*, projected in the point *a*. For the same reason, in the points B, C, D, the star will be projected in *b*, *c*, *d*; and the small circle *a b c d*, will consequently appear to be described.

Admitting the space of the star SP, be so great, that the diameter of the earth's orbit subtends no sensible angle, but appears as a point, then will also the small circle *a b c d* become invisible; and all the lines AP, BP, &c. may be considered as perpendicular to the plane of the orbit, and directed to the same point in the heavens with the perpendicular SP, as to sense. So that, in this case, if light was propagated in an instant, the star P would constantly appear in the point *p*.

Supposing in this particular instance, in which the star is so remote, light be propagated in time, or with a certain velocity, then, as the earth describes its orbit, a spectator will see the star in an oblique direction, and not in the perpendicular, as we have before shewn: that is, if GF be a tangent to the earth's orbit in B, and BE perpendicular to the ecliptic in the point B; then, while the earth moves through the indefinitely small part of the orbit GB, a star at E will appear to move from E to *e*, or, when the earth is in B, to be in *e*.

Seeing then, that the distance SB is but a point with respect to the great distance SP of the star, it follows, that we may refer the spectator from the several points ABCD to the central point S. (fig. 2.) for observing the phenomena of the star at P, which will not be altered thereby. Therefore, if *ca* be parallel to AS, and you make the angle PS*a* equal to *e* BE, (fig. 3.) it is plain the star P must appear in *a*, in the direction S*a*. Also, when the earth is at D, the star will be seen in the oblique direction S*c* at *c*, the spectator being referred to S.

Now, because *bd* is parallel, or alike situated, with respect to DB, and to the tangents in D and B, as CB, it therefore follows, for the same reason, that the star at P will appear in *d* and *b*, when the earth is in D and B; and so, during the space of one year, the star P will appear to describe the small circle *adcb*, supposing the star to be at E (fig. 3.) in the zenith of the spectator; the above small circle *adcb*, will become an ellipse, as in (fig. 1.) if the star be at any distance from the zenith.

It has been remarked above, that these small elliptic motions of the stars occasioned their declinations, as also their distances from the poles of the world to vary 20" on each side. Now, this could not happen from refraction, because, the same phenomenon was observed in the stars near the zenith, where there is no refraction, as well as in those situated at a distance from it. Nor could it result from any nutation in the earth's axis; for that would have rendered the equal distances of



of the stars, in opposite sides of the poles, unequal which never happened. Neither could it be owing to a parallactic motion of the stars; for then, while the earth described the half of its orbits ABC, the star would appear to describe the circle *abc*; whereas, it was found by observation, that the star appeared to describe the circle *abc*, while the earth described the semicircle BCD. It must therefore proceed from the velocity of light bearing a sensible proportion to the annual motion of the earth; and this hypothesis, with the greatest exactness, without even the least difficulty, accounts for all the phenomena.

Formulas for calculating the aberration of the fixed stars in declination and right ascension were added by Dr. Bradley: which formulas have been demonstrated by two different methods, and reduced to a very simple calculus, by M. Clairaut, in the Memoirs of the Royal Academy of Sciences at Paris for the year 1737. The late Mr. Sympton of Woolwich, in his miscellaneous tracts, printed in the year 1745, also most elegantly performed the same thing.

**ABERRATION in Optics**, a dispersion of the rays of light, reflected by a spherical speculum, or refracted by a spherical lens, in consequence whereof they cannot unite in one and the same focal point. This aberration, as arising from two different causes, is of two kinds, the one owing to the figure of the speculum or lens, the other to unequal refrangibilities in the rays themselves; the discovery of which was made by Sir Isaac Newton; and therefore this latter species is sometimes called by writers of optics, the Newtonian aberration of rays.

**ABETTOR**, in law, a person who incites, stirs up, counsels, or procures others to commit a crime. The word is formed from the Saxon *a*, an energetical article, and *betan*, to stir up or excite.

**ABEVACUATION**, in medicine, a partial evacuation.

**ABEYANCE, ABEIANCE, or ABBAYANCE**, in law, the expectancy of an estate. Thus if lands be leased to one person for life, with reversion to another for years, the remainder for years is an abeyance till the death of the lessee.

**ABIB**, signifies an ear of corn, and, in the Hebrew chronology, denotes the first month of their ecclesiastical year, afterwards called *Nisan*. It answered to the latter part of our March, and beginning of April, commencing at the vernal equinox; for they regulated their months according to the course of the moon.

**ABIES**, the **FIR-TREE**, in botany, a genus of the monœcia, monadelphia class of Linæus; the characters of which are, that the flower is amantaceous, and the seeds produced in cones. The leaves are single, and not placed in pairs as in the pine. The tops and leaves of the fir-tree, are recommended to be taken in diet-drinks for the scurvy.

**ABIGENS**, in the civil law, the same with **ABACTOR**.

**AB-INTESTATE**, *ab-intestato*, a term used in the civil law, and respects a person who inherits from one who died without a will, or *intestate*.

**ABISHERING**, in our old law books, charters, &c. a freedom from all amerciaments; also a right to the forfeitures of others.

**ABJURATION**, from *ab*, from, and *juro*, to swear, the act of renouncing or denying a thing on oath; and implies a sworn banishment, as an oath taken to forsake the realm for ever. Thus the abjuration of heresy is the solemn renunciation of some doctrine, as wicked, false, or erroneous.

**ABJURATION**, is now frequently used to signify the renouncing, abjuring or denying upon oath, the Pretender to have any right to the British crown, which is required to be taken upon divers pains and penalties by many statutes, particularly, 1 W. and M. 13 W. III. 1 Anne. 1 Geo. I.

**ABLACTATION**, is Latin, and compounded of *ab*, from, and *lac*, milk, among physicians, signifies the weaning of a child from the breast. See **WEANING**.

**ABLACTATION**, in the ancient agriculture, is a method of ingrafting; wherein the cyon of one tree, being united for some time to the stock of another, is

afterwards cut off, and as it were weaned from its mother-tree. Among the modern writers, *ablation* is more usually called inarching, or grafting by approach.

**ABLAQUEATION**, from the Latin *ab*, and *lacus*, a ditch, a name used by the ancient writers of agriculture for an operation in gardening, whereby the earth is dug from about a vine, or other fruit tree, and its roots are laid bare, to expose them more to the sun, rain, and air, in order to promote its fecundity.

**ABLATIVE**, *ablativus*, the sixth case of Latin nouns, and is peculiar to the Latin language. The dative case signifies the giving of any thing, and therefore the *ablative* is opposed to it, because it signifies that of taking away: thus *ablatus est a me*, it was taken from me. It is sometimes called the comparative case, being used in comparing things together; as *dulcior melle*, sweeter than honey. Among Latin grammarians, it is called ablative absolute, which is governed by no other word, and is much the same with what in English is called a parenthesis, as *juvante Deo*, with God's assistance.

**ABLECTI**, a select body of soldiers among the Romans, chosen from those termed *extraordinarii*.

**ABLEGMINA**, among the ancient Romans, signified those parts of the intrails of victims, which were sprinkled with flour and burnt upon the altar, in sacrificing to the gods.

**ABLUENTS**, in medicine, a name given by some to whatever dilutes, or tends to carry off acrimonious and stimulating salts from the stomach and bowels.

**ABLUTION**, a ceremony used by the ancient Romans before they began the sacrifice, which consisted in washing the body. They very probably learned this ceremony from the Jews, as have also the Mahometans, who still practise it with the utmost strictness.

**ABLUTION**, among chemists, the sweetening any matter impregnated with salts, by repeatedly washing it with pure water.

**ABLUTION**, with physicians, is either the washing of any external part by bathing, or of the stomach and intestines by diluting liquors.

**ABOARD**, from the French *à bord*, as *aller à bord*, *envoyer à bord*, signifying, that when any person goes on the deck, or in the apartments of a ship, he is said to go *aboard*.

**ABOIT**, signifies cerufs, or white lead; according to Rulundus.

**ABOLITION**, signifies the destroying or reducing a thing to nought. In law, it signifies the repealing any law or statute.

**ABOMASUM**, or **ABOMASIOUS**, names of the fourth stomach of ruminating animals. The first stomach is called *venter*, the second *reticulum*, the third *omasus*, and the fourth *abomasus*. The third stomach, *omasis*, is endued with the singular quality of curdling milk. But the truth is, the stomach of almost all animals, whether they ruminate or not, will produce the same effect, though not perhaps in equal degree, as the stomach of calves or lambs.

**ABOMINATION**, a term used in scripture with respect to the Hebrews, who, being shepherds, are said to have been an abomination to the Egyptians; because they sacrificed the sacred animals of that people, as oxen, goats, sheep, &c. which the Egyptians esteemed as abominations, or things unlawful. The term is also applied in the sacred writings to idolatry and idols, because the worship of idols is in itself an abominable thing; and, at the same time, the ceremonies observed by idolaters were always attended with licentiousness, and other odious and abominable actions.

**ABORIGINES**, in geography, an epithet applied to the original or first inhabitants of any country; but more particularly used for the ancient inhabitants of Latium, or country now called *Campagna di Roma*, when Æneas with his Trojans came into Italy.

**ABORTION**, in medicine, is the same with miscarriage, and signifies that a woman is delivered of her burden before the due time, or before the embryo is completely formed or fitted for exclusion. It is also used for a fetus, which, dying in the womb, continues there beyond the usual time of gestation. It is counted unlawful.



unlawful among all christians to procure abortion by artificial means.

ABORTION, among gardeniers, signifies such fruits as are produced too early, and never arrive at maturity.

ABORTIVE, in a general sense, a term used for any thing which comes before its due time, or miscarries in the execution. More particularly, it is used for any thing relating to an abortion, in which sense we say, *an abortive flux, abortive velom, &c.*

ABRA, a silver coin of Poland, in value nearly equivalent to an English shilling.

ABRACADABRA, according to Selden is formed of *Abracax*, the name of a Syrian idol: It is a magical or cabalistical word, recommended by Serenus Samiconus, being written in a certain form, a certain number of times, as a cure for the ague.

ABRAHAM's *Balm*, in botany, a name given to hemp.

ABRAHAMITES, an order of monks, who in the ninth century were exterminated by Theophilus for the worship of images. Also, the name of another sect of heretics who had adopted the errors of Paulus.

ABRASA, in surgery, ulcers, where the skin is so tender and lax as to render them subject to abrasion.

ABRASION, in medicine, the corroding of any part by acrid humours or medicines.

ABRAUM, in natural history, a name by which some call adamic earth, a kind of clay.

ABRAXAS, or ABRASAX, a mystical name found in the ancient theology and philosophy of Basilides's followers, who supposed that under it depended 365 deities.

ABREAST, a sea-term. In an attack, pursuit, or retreat at sea, the squadrons or divisions of a fleet are often obliged to vary their dispositions, and at the same time observe a proper regularity, by sailing in right or curved lines: when they sail at a proper distance from each other, and are all equally forward, they are then said to have formed the line *abreast*.

ABRIDGEMENT, in literature, a term signifying the reduction of a discourse or book into a smaller compass. The art of conveying much sentiment in few words, is one of the happiest talents an author can be possessed of.

ABRIDGEMENT, in law, denotes the making a declaration or plaint shorter by leaving out something. In algebra, it is the reducing a compound equation to a more simple form.

ABROGATION, the act of abolishing a law by authority of the maker.

ABROTANUM, in botany, a synonyme of several plants, such as *Artemisia*, *Filago*, *Santolina*, *Southernwood*. See *SOUTHERNWOOD*.

ABSCISS, in surgery, expresses that critical discharge of humours, which passes not off by the common emunctories, but is separated from the blood, in the capillaries, where it collects in such a quantity, as to form a tumour, and break or corrode the vessels, if the surgeon's art does not otherwise give it vent. The pus or matter thus collected is sometimes included in a cystis, and appears curdy, or else like honey or tallow; and sometimes too in the body of the tumour, stones or other heterogeneous substances have been found. Both Hippocrates and Galen sometimes use the word in a more lax sense, to signify the conversion of one kind of fever into another; as of an intermittent into a continuous, or the contrary: and at others to express any critical evacuation. It is the same with *Aposteme*, or *Impostumation*; and derived from *abscedo*, to go off.

ABSCISS, in farriery, is a purulent tumour incident to several animals, as horses, sheep, poultry, &c.

ABSCISSE, *abscissa*, in conic sections, the part AP, of the diameter of a curve line, intercepted between the vertex A of that diameter, and the point P, where any ordinate or semiordinate, MP, to that diameter, falls. See (*plate I. fig. 4.*) From this definition it is evident, that there is an infinite number of variable abscisses in the same curve, as well as an infinite number of ordinates. In the parabola, one ordinate has but one abscisse; in an ellipsis, it has two; in an hyperbo-

la, consisting of two parts, it has also two; and in curves of the second and third order, it may have three and four.

ABSCISSION, a figure in rhetoric, whereby the orator stops short in the middle of his discourse, leaving the audience to make the inference: e. g. one of her age and beauty; to be seen alone, at such an hour, with a man of his character. I need say no more.

ABSCISSION, in surgery, the same with amputation.

ABSENT, in law, signifies any one who has left his habitation.

ABSINTHIATED *medicines*, those impregnated with the virtues of *absinthium*, or wormwood: thus we say absinthiated wine, absinthiated ale, absinthiated water. Dioscorides and many others strongly recommend them.

ABSINTHIUM, wormwood, in botany, a genus of plants comprehended by Linnæus among the *artemisia*s, or mug-worts. Wormwood is greatly commended for its medicinal virtues; it strengthens the stomach, removes obstructions of the liver and spleen, creates an appetite, and destroys worms. It is also used in many other intentions, for which see *WORMWOOD*.

ABSIS, in astronomy, a synonyme with apsis. See *APSIS*.

ABSOLUTE, in a general sense, denotes a thing's being independent of, or unconnected with, any other; it is used also to express freedom from all limitation.

ABSOLUTE *Government*, is that wherein the prince, unlimited by the laws, is left solely to his own will.

ABSOLUTE, in metaphysics, denotes a being that possesses independent existence.

ABSOLUTE *Equation*, in astronomy, is the aggregate of the optic and eccentric equation. See *EQUATION*.

ABSOLUTE *Gravity*, in physics, implies the whole force by which a body is urged downwards. See *GRAVITY*.

ABSOLUTE *Motion*. See the article *MOTION*.

ABSOLUTE *Number*, in algebra, is the known quantity or number which possesses one entire side, or part of the equation; being the rectangle or solid whose root or value is to be found. Thus in the equation  $aa + 16a = 36$ , the *absolute number* is 36; which is equal to  $a$  multiplied by itself, added to 16 times  $a$ . This is what Vieta calls *homogeneum comparationis*.

ABSOLUTION, in a general sense, implies the act of pardoning or forgiving. It is granted either by a prince or magistrate, and stops the execution of justice.

ABSOLUTION, in civil law, is a definitive sentence, whereby the party accused is declared innocent of the crime laid to his charge.

ABSOLUTION, in the canon law, is a juridical act, whereby the priest, as a judge, and in virtue of a power given him by Jesus Christ, remits the sins of such as, upon confession, appear to bring forth fruits meet for repentance.

ABSOLUTION, among Papists, a power assumed by the priests to forgive sins *absolutely*, that is, by virtue of a power inherent in themselves. By stat. 23 Eliz. to procure absolutions from Rome is declared to be high-treason. Protestant divines pretend to no such power, but only declare the scripture terms of pardon.

ABSORBENTS, in the healing art, is a general name for all such medicines as have the power of imbibing the superfluous humours in the stomach or intestines. All the testaceous powders, chalks, earths, calcined bones, &c. are medicines of this kind.

The word is compounded of the Latin *ab*, and *sorbeo*, to drink. Absorbents are chiefly given when the absorbent humours are of the acid kind. But perhaps among this numerous class of remedies, there is not one equal to the *magnesia alba*; because it not only absorbs the acid juices, but also by its gentle purgative quality, carries the offending matter off by stool.

ABSORBENT *Vessels*, in anatomy, a name given promiscuously to the lacteal vessels, lymphatics, and inhalant arteries. The cutaneous vessels are called by the



same name, from their absorbing a part of the water of baths, fomentations, &c.

ABSORBENT *Vessels*, is also a name used for the small fibrous roots of plants.

ABSTEMIOUS, those people are so called, who are very temperate in eating and drinking. It is likewise an epithet applied to those who could not partake of the eucharist on account of their aversion to wine.

ABSTENTUS, in law, an heir who is withheld by his tutor from entering upon his inheritance.

ABSTERGENT *medicines*, those employed for resolving obstructions, concretions, &c. such as soap, &c. Castillus has confounded them with ablutents: but this is an abuse of terms.

ABSTINENCE, in a general sense, implies the refraining from something we have a propensity to; particularly from eating and drinking.

The Jews were obliged to abstain from their wives at certain seasons. This is enjoined in the apostolical constitutions on all fast and meagre days: the church of England recommends certain days of fasting and abstinence. *Abstinence* from flesh has been enjoined by statute even since the reformation, particularly on Fridays and Saturdays, and on vigils, and all commonly called fish days, 2 and 3 Ed. VI. c. 19. The like injunctions were renewed under Q. Elizabeth, but at the same time it was declared, that this was done not out of motives of religion, as if there were any difference in meats, but in favor of the consumption of sea-fish, and to multiply the number of fishermen and mariners, as well as to spare the stock of sheep. 5 Eliz. c. 15. The great fast, says St. Augustine, is to *abstain* from sin.

ABSTINENCE is more particularly used for a spare diet, or a slender parsimonious use of food, much below the ordinary standard of nature.

The physicians relate wonders of the effects of abstinence in the cure of many disorders, and in protracting the term of life. The noble Venetian Cornaro, after all imaginable means had proved vain, so that his life was despaired of at forty, recovered and lived to near an hundred, by mere dint of abstinence; as he himself relates.

It is indeed surprising, to what a great age the primitive christians of the east, who retired from the persecutions into the deserts of Arabia and Egypt, lived, healthful and chearful, on a very little food. Many instances also of longevity, from the same cause, we have at home. Buchanan writes, that one preserved himself to an hundred and forty by force of temperance and labor; and Spotswood mentions one Kentigern, afterwards called S. Mongah, or Mungo, who lived to an hundred and eighty-five by the same means.

Most of the chronical diseases, the infirmities of old age, and the short lives of Englishmen, are owing, according to Dr. Cheney, to repletion; and may be either cured, prevented, or remedied, by abstinence.

ABSTINENTS, in church history, a sort of people in the ancient church who carried their abstinence and mortification very far. They have been classed with heretics, though we have no certain account of their particular opinions.

ABSTRACT *idea*, in metaphysics, is a partial idea of a complex object, limited to one or more of the component parts or properties, laying aside or abstracting from the rest. Thus, in viewing an object with the eye, or recollecting it in the mind, we can easily abstract from some of its parts or properties, and attach ourselves to others: we can attend to the redness of a cherry, without regard to its figure, taste, or consistence.

ABSTRACT *terms*, words that are used to express abstract ideas. Thus beauty, ugliness, whiteness, roundness, life, death, are abstract terms.

ABSTRACT *mathematics*, sometimes denominated *pure mathematics*, treat of magnitude or quantity absolutely and generally considered, without regard to any particular species of magnitude.

ABSTRACT *numbers*, such as have no particular application.

ABSTRACT, is also a term in literature to signify a

concise, yet general view or analysis of some larger work. It differs from an abridgment, in being shorter and more superficial; and from an extract, as this last is a copy of some part or passage of it.

ABSTRACTION, the operation of the mind, when occupied by abstract ideas. A large oak fixes our attention, and abstracts us from the shrubs that surround it. In the same manner, a beautiful woman in a crowd, abstracts our thoughts, and engrosses our attention solely to herself. These are examples of real abstraction: when these, or any others of a similar kind, are recalled to the mind, after the objects themselves are removed from our sight, they form what is called *abstract ideas*, or the mind is said to be employed in abstract ideas. But the power of abstraction is not confined to objects that are separable in reality as well as mentally: the size, the figure, the colour of a tree are inseparably connected, and cannot exist independent of each other; and yet we can mentally confine our observations to any one of these properties, neglecting or abstracting from the rest.

ABSTRACTION, in chemistry, the evaporating or drawing off a menstruum from the subject it had been put to dissolve. Some also use the word abstraction, as synonymous with distillation and cohobation.

ABSTRUSE, a term applied to any thing that is hard to be understood, whether the obscurity arises from the difficulty of subject, or the confused manner of the writer.

ABSURD, an epithet for any thing that contradicts an apparent truth, or the received opinions of mankind: thus it would be absurd to affirm, that twelve inches are not equal to a foot. When applied to actions, absurd is synonymous to ridiculous.

There is an argument, called *reductio ad absurdum*; which proves a thing to be true, by shewing the absurdity of the contrary supposition.

ABSURDITY, that imperfection whereby any thing may be denominated absurd.

ABSUS, in botany, the trivial name of a species of the cassia.

ABUCO, ABOCO, or Aboochi, a weight used in the kingdom of Pegu, equal to  $12\frac{1}{2}$  teccalis; two abucos make an agiro; and two agiri make half a biza, which is equal to 2lb. 5 oz. of the heavy weight of Venice.

ABUNA, the title of the archbishop or metropolitan of Abyssinia.

ABUNDANCE, ABUNDANTIA, overflowing, is compounded of *ab* from, and *unda*, wave or water. Abundance when carried to an excess is a fault, called redundancy, exuberance, &c.

The author of the *Dictionnaire Oeconomique* gives different manners or secrets of producing abundance; as an abundant crop of wheat, pears, apples, peaches, &c.

ABUNDANT *Numbers*, such whose aliquot parts added together exceed the number itself; as 20, the aliquot parts of which are, 1, 2, 4, 5, 10, and make 22.

ABUSE, implies the perverting of any thing from its original intention. Thus an abuse of words is the using them without any clear and distinct ideas.

ABUTALS, signify the buttings or boundings of land towards any point. Limits were anciently distinguished by artificial hillocks, which were called *botentines*, and hence *butting*. In a description of the site of land, the sides on the breadth are more properly called *adjacentes*, and those terminating the length *abbutantes*; which, in old surveys, were sometimes expressed by *capitare*, to head; whence abutals are now called *head lands*.

ABUTILON, in botany, a genus of plants, the flower of which resembles that of the mallow, but the fruit is a kind of head composed of bivalve capsules: these are affixed to an axis, and usually contain kidney-shaped seeds. It is diuretic and vulnerary; its leaves, applied to ulcers and sores, serve to cleanse them; and its seed taken inwardly, promote urine, and expel the gravel.

ABYSS, in a general sense, signifies any unfathomable gulph. It is also the name of a vast cavern filled with



with water, supposed to exist near the centre of the earth.

ABYSS, in scripture, is sometimes used for hell.

ABYSS, in antiquity, a name given to the temple of Proserpine.

ABYSS, among alchemists, signifies the receptacle of the seminal matter, and sometimes the seminal matter itself.

ACACIA, in the materia medica, the inspissated juice of the unripe fruit of the Acacia. This juice is brought from Egypt in roundish pieces, wrapt up in thin bladders, and is used as a mild astringent.

The *German* ACACIA is a counterfeit of the former, being made of the juice of unripe sloes, boiled to the consistence of a solid extract, and put up in bladders like the former. It is distinguished from it chiefly by its colour, which is as black as that of Spanish liquorice. It is used as a substitute to the *real* Acacia.

ACACIANS, a name given to a particular sect of the Ariens, from Acacius of Caesarea, who was their chief.

ACADEMICS, a sect of philosophers who followed the doctrine of Socrates and Plato, with regard to the uncertainty of human knowledge, and the incomprehensibility of truth.

Academic, taken in this sense, amounts to much the same with what we call Platonist, the only difference between them being that of commencement. The ancients who embraced Plato's system were called academici, academics; whereas those that followed the same opinions since the restoration of learning, have taken the denomination of Platonists.

It may be said, that Socrates and Plato, who laid the first foundations of the academy, were not so erroneous as those who succeeded them; we mean Arcefilas, Carneades, Clitomachus, and Philo. Socrates indeed professed to know nothing; but his doubts arose from physics only, which he at first diligently cultivated, and which he afterwards acknowledged to surpass the reach of human understanding: if he sometimes spoke in the language of the sceptics, it was out of irony or modesty, in order to pull down the vanity of the sophists, who foolishly boasted, that they were ignorant of nothing, and always ready to dispute on all manner of subjects.

The father and institutor of the academy, Plato, who was instructed by Socrates in the art of doubting, and was likewise his avowed disciple, confined himself to his own manner of treating subjects, and undertook to oppose all the philosophers who had preceded him: but, by recommending to his disciples a diffidence of themselves, and to doubt of every thing, he did not intend to leave them fluctuating between truth and error; but to put them on their guard against those rash and precipitate decisions, so natural to youth, and prevent their falling into error, by freely examining every thing without prejudice.

Arcefilas undertook to reform the ancient academy, and erect a new one. It is said that he imitated Pyrrho, and conversed with Timon: so that, having enriched Pyrrho's art of doubting, with the elegant erudition of Plato, and armed it with the dialectics of Diodorus, Aristo compared him to a chimera, and with great pleasantry applied to him the verses, where Homer says, that "She was a lion before, a dragon behind, and a goat in the middle." Thus, according to him, Arcefilas was Plato before, Pyrrho behind, and Diodorus in the middle; for which reason some rank him in the number of the sceptics; and Sextus Empiricus maintains, that there is but a very small difference between his sect, or the sceptic, and that of Arcefilas, called the new academy.

He taught, indeed, that we do not even know whether we know any thing; that nature has not given us any rule of truth; that human understanding and the senses are incapable of comprehending truth; that he found in every thing reasons opposed by an equal force; and, in a word, that all things are immersed in darkness; and consequently that we must always suspend our assent. His doctrine was not much applauded, because he seemed desirous of extinguishing every ray of science, of throwing darkness on the mind, and over-

turning the foundations of philosophy. Lacydes was the only person who defended the doctrine of Arcefilas: he transmitted it to Evander, one of his disciples, and Evander transmitted it to Hegesimus, who handed it down to Carneades.

Carneades however did not follow the doctrine of Arcefilas in every particular, though he retained its principal tenets: this made him pass for the author of a new academy, which was called the third. He opposed, with great wit and eloquence, all the opinions proposed to him, without discovering his real sentiments. He first made Rome acquainted with the power of eloquence and the merit of philosophy; and that flourishing state, attracted by the novelty and excellence of so noble a science, followed Carneades with so much eagerness, that Cato, a man in all other respects of an excellent judgment, but deficient in politeness, grew jealous of this new kind of erudition, which had the power of captivating the affections of mankind. Cato declared in the senate, that they ought to grant Carneades, and the deputies which accompanied him, whatever they demanded, and send them instantly back with honour to their country.

His eloquence was so powerful, that he overturned whatever he undertook to oppose, confounded reason by reason itself, and remained invincible in the opinions he maintained. The stoics, a contentious and subtle people in disputations, and with whom Carneades and Arcefilas had frequent contests, found it very difficult to escape the snares he laid for them: and therefore, in order to diminish his reputation, they asserted that all he alledged against them was taken from the books of Chrysippus the stoic. Carneades, to whom Cicero allows the art of refuting every thing, modestly allowed, that, without the help of Chrysippus, he should have done nothing; and that he would engage Chrysippus with his own weapons.

The corrections which Carneades made in the doctrine of Arcefilas are very trifling: it is easy to reconcile what Arcefilas said, "that he found no truth in things," with what Carneades advanced, "that he did not deny there being some truth in things, but that we have no rule whereby to discern it; for there are two kinds of truth, the one what we call truth of existence, the other truth of judgment." It is therefore plain that those two propositions of Arcefilas and Carneades regard the truth of judgment. But the truth of judgment is in the number of relative things, which ought to be considered as having a relation to our mind; when therefore Arcefilas said, there was nothing true in things, he meant, that there was nothing in things that the human mind could know with certainty; and this is exactly the same with what Carneades maintained.

Arcefilas said, that nothing could be comprehended, and that all things were obscure. Carneades granted, that nothing could be comprehended, but did not, for that reason, allow that all things were obscure; because probable things were not, in his opinion, obscure. But though he made some difference in expression, he made no difference in effect; for Arcefilas did not maintain, that all things are obscure otherwise than as they cannot be comprehended, nor did he divest them of all semblance of truth or probability: this was also the sentiment of Carneades; for when he said, that things were not so obscure, but we might discern those which ought to be preferred for the purposes of life, he did not pretend that they were clear enough to be comprehensible: it follows therefore that there was no diversity of sentiment between them, when Carneades permitted the wise man to entertain opinions, and perhaps even sometimes to testify his own consent: and, when Arcefilas forbid both the one and the other, Carneades only asserted, that the wise man ought, for the common purposes of life, to make use of probable things, without which he could not live; but not in the conduct of the mind, and in the search after truth; and whence only Arcefilas banished both opinion and consent. Consequently their differences consisted in expressions only, and not in the things themselves.

Philo,



Philo, the disciple of Clitomachus, who had himself been a pupil of Carneades, deserved to be stiled with Charmides, "the founder of the fourth academy," as he differed in some points from the sentiments of Carneades: for he asserted, that things are in themselves comprehensible, though we are unable to comprehend them.

Antifichus was the founder of the fifth academy. He had been several years a disciple of Philo, and maintained the doctrine of Carneades; but, in the decline of life, he quitted his master's party, and introduced into the academy the tenets of the stoics, which he attributed to Plato, maintaining that the doctrine of the stoics was not new, but a reformation of the ancient academy. This fifth academy therefore was only an association of the ancient academy, and the philosophy of the stoics; or rather the stoical philosophy, dressed in the habit of the old academy, which flourished under Plato and Arcefilas.

Some have indeed pretended that there was only one academy: for as the several branches which spring from the same root, and spread themselves on different sides, are not different trees; so all those sects which sprung from the different stock of the doctrine of Socrates, *that man knows nothing*, though divided into several schools, are no more than one academy. But, if we examine attentively, we shall discover so remarkable a difference between the old and new academies, that we must necessarily acknowledge two academies; the old, or that of Socrates or Antiochus, and the new, which was founded by Arcefilas, Carneades, and Philo: the first was dogmatical in some points, the first principles and some moral truths at least were therein honoured and respected; whereas the new one almost entirely approached to scepticism.

ACADEMY, in antiquity, a garden or villa, situated within a mile of Athens, where Plato and his followers held their philosophical conferences. It took its name from one Academus, or Ecademus, a citizen of Athens, who was the original owner of it, and made it a kind of gymnasium: he lived in the time of Theseus. Cimon embellished it with fountains, trees, and walks; but Sylla, during the siege of Athens, employed these very trees in making battering-engines against the city. Cicero too had his villa, or place of retirement, near Puzzuoli, which he also named an academy. Where he composed his *Academical Questions*, and his book *De natura deorum*.

ACADEMY, among the moderns, is most commonly used to signify a society of learned men, established for the improvement of any art or science. Charlemagne was the first that established an academy in Europe. Most nations have since followed his example; but Italy has by far the greatest number. In the cities of Piedmont, Ferrara, and Milan, Jarckius reckons 550. We have but few in Britain. In England those of note are, the Royal Society, the Antiquarian Society, Society for the Encouragement of Arts, and the Academy of Painting; in Scotland, the Edinburgh Society, College of Physicians, and Musical Society; all which see in their proper places.

The French have several academies; as, the Royal Academy of Sciences, for the improvement of Physics, Mathematics, and Chemistry. It was first instituted in 1666, by the assistance of Mr. Colbert, comptroller-general of the finances, but was not confirmed by the French king till the year 1696, who, by a regulation dated the 26th of January, new-modelled and put it on a better footing. According to this regulation, the academy was to be composed of ten honorary academicians, eight strangers associates, twenty pensionaries fellows, twenty eleves or scholars, and twelve French associates; these were to be divided into six classes, viz. geometers, astronomers, mechanics, anatomists, chemists, and botanists; the honorary academists to be all inhabitants of France, the pensionaries and eleves all to reside at Paris.

In the year 1716, the duke of Orleans, then regent, made an alteration in their constitution, augmenting the number of honoraries and associates to twelve, admitting regulars among such associates, suppressing the class

of eleves, and establishing in lieu thereof a new class of twelve adjuncts to the six several kinds of science cultivated by the academy; and, lastly, appointing a vice-president, to be chosen yearly by the king out of the honorary members, and a director and sub-director out of the pensionaries.

The academies of Florence and Bologna, of Montpellier and Bourdeaux, of Leipzig and Berlin, and of late those of Petersburg and Seville, were formed upon the same model with the Royal Academy of Sciences.

*French Academy*, a society of forty, established for improving the French language.

This academy was founded by Cardinal Richlieu, and confirmed by the edict of Lewis XIII. in 1635. They have compiled a dictionary, intitled, *Le Dictionnaire de l'Academie Françoise*. This work was begun in 1637, and finished in 1694. They have a director and chancellor, who are drawn by lot every three months, and a secretary who is perpetual. They meet at the old Louvre, on Mondays, Thursdays, and Saturdays, all the year round, and hold an extraordinary meeting at the reception of a new member, and on St. Lewis's day, when the prizes of eloquence and poetry are adjudged.

*Royal ACADEMY of Painting and Sculpture*. This Society was founded about the year 1648. The members were at first about twenty-five in number, viz. twelve officers, called *ancients*, eleven private members, and two syndics; but at present it consists of forty painters and sculptors. There are four perpetual rectors, nominated by the king; a director and chancellor; a secretary, who keeps the register, and countersigns the dispatches; a treasurer, twelve professors, adjuncts to the rectors and professors, six counsellors, a professor for the part of anatomy that belongs to painting and sculpture, and another for geometry and perspective.

There is also an academy of painting, sculpture, &c. at Rome, established by Lewis XIV. wherein those who have won the annual prize at Paris, are entitled to be three years entertained for their further improvement.

*ACADEMY of Medals and Inscriptions*, called also *The Academy of belles lettres*, was erected by Lewis XIV. for the study and explanation of ancient monuments, and to perpetuate the remembrance of great events, by medals, relievos, inscriptions, &c. The plan of this academy was formed by Mr. Colbert, and established in 1663. In its first institution it consisted only of four or five members; but in 1701, they were increased to forty, viz. ten honoraries, ten pensionaries, ten associates, and ten novices or eleves, under the direction of a president and vice-president, who are annually appointed by the king.

Their chief employment has been upon the medallic history of the reign of Lewis their founder. But the learned are indebted to this academy for many volumes of essays on other parts of history, published under the title of *Memoirs*, &c.

*ACADEMY of Architecture*, established about the end of the year 1671, by Mr. Colbert, consisted at first only of six architects; but their number is since considerably increased.

*ACADEMY of Politics*, is composed of six persons, who meet at the Louvre, in the chamber where the papers relating to foreign affairs are lodged. But as the kings of France are unwilling to trust any, except their ministers, with the inspection of foreign affairs, this academy is of little use to the public.

*Royal ACADEMY of Dancing* was established by the King of France in 1661. It consists of thirteen able dancing-masters, who meet once a month; and two of the academists teach by turns the art of dancing, ancient and modern.

The French have also academies in most of their great cities, as, the Academy of Sciences at Montpellier, that of the Lanternists at Thoulouse; besides others at Nîmes, Arles, Angiers, Lyons, Caen in Normandy, &c. and the Chirurgical Academy at Paris is a modern institution for the general improvement of the art, and to compile and publish the ancient and modern history of it.

*Royal Spanish ACADEMY* at Madrid, has for its object the cultivation of the Castilian tongue, and was esta-



established in 1714, by the Duke d'Escalona, with the approbation of the King of Spain. It consists of twenty-four academists, including the director and secretary.

In Portugal, John V. founded an historical academy at Lisbon, in the year 1720, for collecting and ascertaining the history of his own dominions. It consists of fifty members, a director, four censors, and a secretary.

In Germany, they have the Academy of *Naturæ Curiosæ*, otherwise called the *Leopoldine Academy*, founded in 1652, by Jo. Laur. Baufch, a physician, and, in 1670, taken under the protection of the Emperor Leopold. The design of this society was to promote medical knowledge. They began in 1684 to publish their observations, under the title of *Ephemerides*; which publication has been continued annually, with some interruptions, and under different titles. This academy consists of a president, two adjuncts or secretaries, and colleagues or members without limitation.

*Berlin ACADEMY*, was founded by Frederick I. the late King of Prussia, in the year 1700. It has for its objects the improvement of natural knowledge, and the belles lettres. The charter of this society was amended in 1710, and by it the president is to be nominated by the king. The members are divided into four classes; 1. for physic, medicine, and chemistry; 2. for mathematics, astronomy, and mechanics; 3. for the German language, and the history of the country; 4. for oriental learning, particularly what relates to the propagation of the gospel among infidels. The great promoter of this foundation was the celebrated Mr. Leibnitz.

*Russian ACADEMY* was founded by Czar Peter the Great, at Petersburg, upon the plan of the Academy of Sciences at Paris; besides which, they take in the Russian language.

*ACADEMY* is also a term for schools and other seminaries of learning among the Jews, where their rabbins and doctors instructed their youth in the Hebrew language, and explained to them the Talmud, and the secrets of the Cabbala: Those of Tiberias and Babylon have been the most noted.

*ACADEMY* is often used with us to denote a kind of collegiate school, where youth are instructed in arts and sciences. There is one at Portsmouth for teaching navigation, drawing, &c. another at Woolwich for fortification, gunnery, &c.

*ACADEMY* is likewise a name given to a riding-school, where young gentlemen are taught to ride the great horse, &c. and the ground allotted for it is usually called the *Menage*.

*ACADEMY figure*, a drawing of a naked man or woman, taken from the life, which is usually done on paper with red or black chalk, and sometimes with pastils or crayons.

*ACAJOU*, the *CASHEW-NUT-TREE*, in botany, the name of a tree, comprehended by Linnæus among the anacardiæ. Its flower consists of one funnel-shaped leaf, divided into many segments at the edges: the pistil, which is surrounded with a number of stamens, finally becomes a soft turbinated fruit, with a kidney-shaped capsule affixed to it, in which is contained a seed of the same shape.

The *Acajou* is a native of Brasil, of the fruit of which the Indians make a kind of vinous intoxicating liquor. The kernel of the Cashew-nut may be eaten, when roasted, but its husk is extremely acrimonious. The dyers make use of the oil drawn from it, in dying black.

*ACALYPHA*, in botany, is ranked by Sir Hans Sloane with the nettles under the name of *urtica minor spinosa*. The calix of the male consists of four leaves, and that of the female of two valves; neither of them have any corolla; the male has a cup-shaped nectarium, and the female bears one smooth seed.

*ACAMATOS*, a word used to express the best shape of the human body.

*ACAMEEH*, among some of the old chymists, the scoræ of silver, as also a superfluity of the humidum radicale.

*ACANACEOUS plants*, such as are armed with prickles.

*ACANGIS*, i. e. *ravagers or adventures in quest of fortune*; a name given by the Turks to their hussars, who like ours, are light troops, fitter for skirmishing and pillaging, than to engage with regular troops in an action; they are generally sent out in detachments to get intelligence, harass the enemy, attack convoys, and ravage the country.

*ACANTHA*, in botany, the prickly of any plant.

*ACANTHA*, in zoology, a name for the spine, or prickly fins of fishes.

*ACANTHA*, in anatomy, signifies the protuberances of the back-bone, commonly called *spinæ dorsæ*.

*ACANTHABOLUS*, in surgery, an instrument for pulling thorns, or the like, out of the skin.

*ACANTHACEOUS*, a term used by botanists to signify all plants of the prickly kind. The word is formed from the Greek *acanthis*, a thorn.

*ACANTHINE*, any thing resembling or belonging to the herb acanthus. Acanthine garments, among the ancients, are said to be made of the down of thistles; others think they were garments embroidered in imitation of the acanthus.

*ACANTHOIDES*, in botany, a synonyme of the carlina, or carline-thistle.

*ACANTHOPTERYGIOUS fishes*, a term used by Linnæus and others, for those fishes whose back-fins are hard, osseous, and prickly.

*ACANTHUS*, in botany, the name of a genus of polyandrious plants, called in English bear's-breech.

The flower of the Acanthus consists of one leaf, the interior part of which is divided into three segments, and the hinder part forms a kind of ring. The pistil, which rises from the cup, finally becomes an acorn-shaped fruit, containing a number of gibbous seeds. See (plate III. fig. 2.)

The Acanthus may be known when not in flower, by its beautiful leaves, which are so elegant as to be imitated on carvings.

*ACANTHUS* is also the name by which Theophrastus calls the acacia-tree. See *ACACIA*.

*ACANTHUS*, in architecture, the elegant enrichments both of the corinthian and composite capitals. The Greek sculptors imitated the leaves of the soft Acanthus, as the Goths did those of the prickly kind.

*ACANUS*, in botany, a synonyme of the carduus casabonæ of Linnæus. See *CARDUUS*.

*ACAPATLI*, the American name of the piper longum, or long pepper.

*ACAPNON*, in botany, an obsolete name of the origanum or marjoram. See *ORIGANUM*.

*ACARNA*, a term used by Vaillant, for cynaracephalous or artichoke-headed plants: and a name for the common thistle, by others.

*ACARI*, the name of insects that breed under the skin. Aristotle calls the small insects that breed in wax by the same name.

*ACATALECTIC*, *ακαταληκτικόν*, in ancient prosody, an appellation given to such verses as have all their feet, in contradistinction to those which want a syllable to make up the last foot.

*ACATALEPSIA*, *acatalepsia* a synonymous term with incomprehensibility. The Pyrrhonists or sceptics asserted an absolute *acatalepsia*.

*ACATASTATOS*, with physicians, signifies the irregular paroxysms of a disease.

*ACATERY*, a kind of check betwixt the clerks of the kitchen, and the purveyors of the king's household. The officers of the *Acaterie* consist of a serjeant, two joint-clerks, and a yeoman of the salt stores.

*ACATHISTUS*, in church history, a hymn anciently sung in the Greek church in honour of the Virgin; and was so called by reason the people stood all the time it was celebrating.

*ACATIUM*, a kind of boat, very sharp at the head, used by the ancients in military affairs.

*ACAULIS*, in botany, signifies plants that have no caulis or stem.

*ACCALIA*, in antiquity, solemn feasts held in ho-



nor of Acca Laurentia, nurse to Romulus. They were otherwise called *Laurentalia*.

ACCEDAS *ad curiam*, in the English law, a writ lying where a man hath received, or fears false judgment in a hundred-court, or court-baron. It is issued out of the Chancery, and directed to the sheriff, but returnable in the King's-bench or Common-pleas. It lies also for justice delayed, and is said to be a species of the writ *Recordare*.

ACCELERATED *motion*, the word is compounded of *ad*, to, and *celer*, swift; and stands directly opposed to retardation, which denotes a diminution of velocity. The motion of falling bodies is an *accelerated motion*: and suppose the medium they fall through, i. e. the air, void of resistance, the same motion may be also considered as *uniformly accelerated*.

A body having once begun to descend through the impulse of gravity, that state is now, by Sir Isaac Newton's first law, become as it were natural to it, in so much that, were it left to itself, it would for ever continue to descend, even though the first cause of its descent should cease. But, besides this determination to descend, impressed upon it by the first cause, which would be sufficient to continue the degree of motion already began to infinity, new impulses are continually superadded by the same cause, which continue to act upon the body already in motion, in the same manner as if it had remained at rest: there being then two causes of motion, acting both in the same direction, it necessarily follows, that the motion which they unitedly produce, must be more considerable than what either could produce separately; and, as long as the velocity is thus increased, the same cause still subsisting to increase it yet more, the descent must of necessity be continually accelerated.

The space run through by a moving body during a given time, and with a given velocity, may be considered as a rectangle compounded of the time and the velocity. Suppose A (*plate I. fig. 5.*) to be the heavy body which descends, AB the time of the descent, which let be divided into a certain number of equal parts, denominated intervals or proportions of the given time, as AC, CE, EG, &c. Imagine the body to descend, during the time expressed by the first of the divisions AC, with a certain uniform velocity arising from the degree of gravity acting on it, this velocity will be represented by AD, and the space run through, by the rectangle CAD. Now the action of gravity having produced in the first moment, the velocity AD, in the body before at rest; in the second moment it will produce the velocity CF, the double of the former; in the third moment, to the velocity CF will be added one degree more, by which means will be produced the velocity EH, triple that of the first, and so of the rest: so that during the whole time AB, the body will have acquired the velocity BK. After this, taking the divisions of the line at pleasure: for example, the divisions AC, CE, &c. for the times; the spaces run through during those times, will be as the areas or rectangles CD, EF, &c. So that the space described by the moving body, during the whole time AB, will be equal to all the rectangles; that is to say, to the whole intended space ACEGBKLHFD.

Thus it will happen if the increments of velocity be produced, as we may say, all at once, at the end of certain portions of finite time; for instance, at C, at E, &c. so that the degree of motion remains the same to the instant that a new acceleration takes place. By imagining shorter divisions of time, for example, but half so long as the former, the indentures of the figure will be proportionably more contracted, and it will approach near unto a triangle: and, if they be taken infinitely small; that is, if increments of the velocity be supposed to be acquired continually, and at each indivisible particle of time, which is really the case, the rectangles so successively produced will form a true triangle, as ABE; (*plate I. fig. 6.*) the whole time AB consisting of minute portions of times, A<sub>1</sub>, A<sub>2</sub>, A<sub>3</sub>, &c. and the area of the triangle ABE, of all the minute surfaces, or minute trapeziums, which answer

to the divisions of the times, the area of the whole triangle, expressing the space run through during the time AB: or the triangles ABE, A<sub>1</sub>f being similar, their areas are to each other as the square of their homologous sides AB, A<sub>1</sub>, &c. and consequently the spaces gone through, are to each other as the squares of the times.

Whence also may be deduced this great law of acceleration: *That a body descending with an uniformly accelerated motion, describes in the whole time of its descent a space which is exactly the half of that which it would describe uniformly in the same time with the velocity it acquired at the end of its fall.* For, as we have already shewn, the whole space which the falling body has run through in the time AB, will be represented by the triangle ABE, and the space that body would run through uniformly in the same time, with the velocity BE, will be represented by the rectangle ABEF. But it is well known that the triangle is exactly equal to half the rectangle: so that the space run through, will be the half of that which the body would describe uniformly in the same time with the velocity acquired at the end of its fall.

We may therefore conclude: First, That the space which would be uniformly described in half the time AB, with the ultimately acquired velocity BE, is equal to that which has been actually run through by the falling body during the whole time AB.

Secondly, If the falling body describes any given space, or length, in a given time; in twice that time it will describe four times as much; in thrice that time, nine times as much, &c. In a word, if the times are in proportion to each other, as the series 1, 2, 3, 4, &c. the spaces run through will be as the squares of these numbers; that is, as 1, 4, 9, 16, &c. that is, if a body describes, for example, 16 feet in the first second of its fall, in the two first seconds taken together, it will describe four times 16 feet, nine times 16 feet in the three first seconds taken together, and so on.

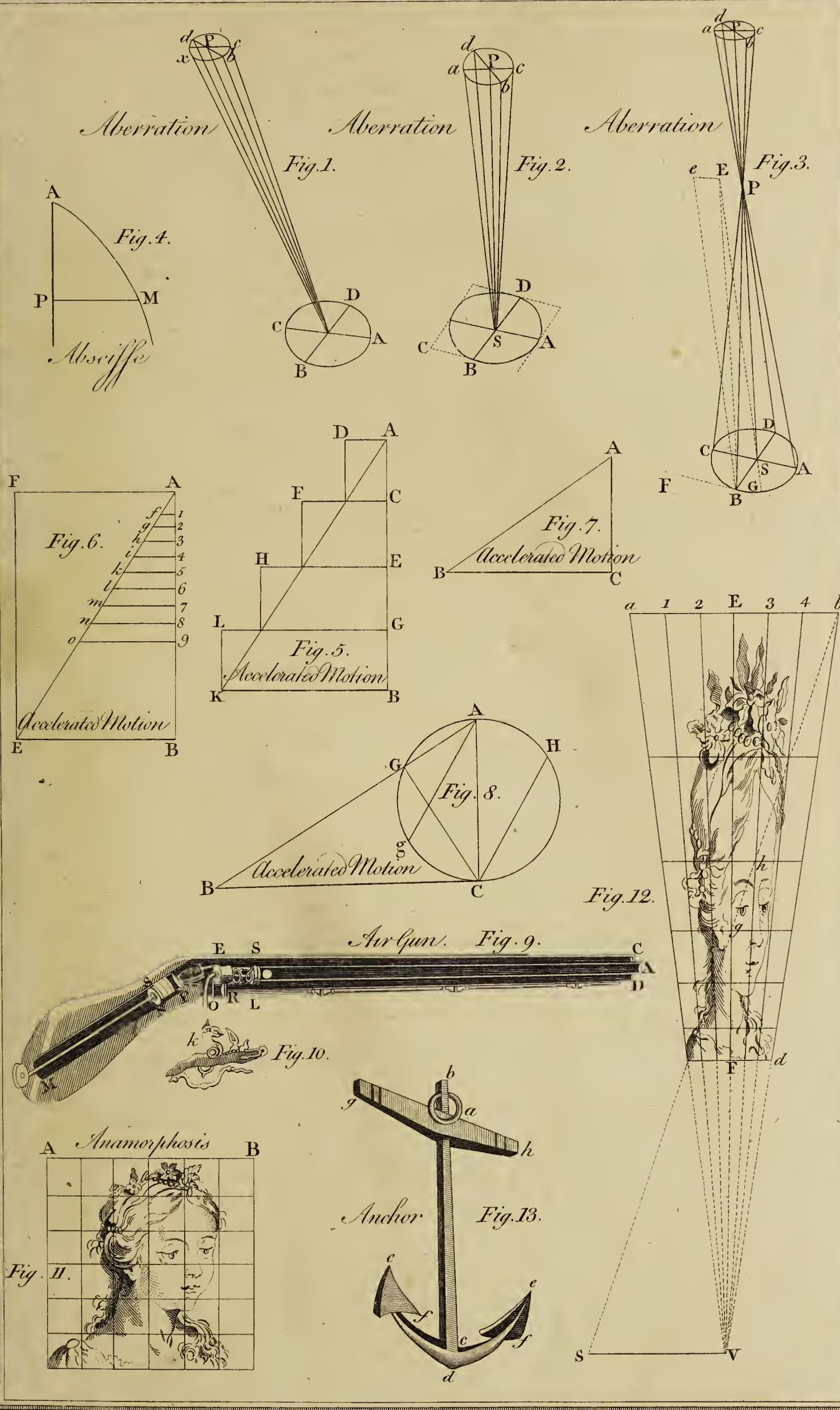
Thirdly, The spaces described by falling bodies, in a series of equal instants, or intervals of time, will be as the odd numbers 1, 3, 5, 7, 9, &c. that is, the body which has run through 16 feet in the first second, will in the next second run through 48 feet, in the third second 80 feet, &c. And, since the velocities acquired in falling are as the times, the spaces will be likewise as the squares of the velocities, and the times, and the velocities, in the subduplicate ratios of the spaces.

The motion of an ascending body, or of one that is impelled upwards, is diminished or retarded by the same principle of gravity, acting in a contrary direction, after the same manner that a falling body is accelerated.

A body projected upwards, ascends until it has lost all its motion, which it does in the same interval of time that the same body would have taken up in acquiring by falling, a velocity equal to that with which the falling body began to be projected upwards: and consequently the heights to which bodies projected upwards, with different velocities, arrive, are to each other as the square of those velocities.

ACCELERATED *Motion of Bodies upon inclined Planes*, in mechanics. Let two equal bodies descend by the force of gravity, from the point A, (*plate I. fig. 7.*) the one along the line AB, and the other along the line AC; when they are come to the points B, C, they will be got equally near to the earth's centre: therefore the forces with which they are impelled, as they are both directed towards the earth's centre, will be equal. But the intensities of equal forces, are reciprocally as the spaces gone through; and therefore, here, the intensity of the force, by which the body is impelled along the inclined plane, is to the intensity by which it is impelled directly towards the centre of the earth, as A to B. Therefore, a body incumbent, on an inclined plane, loses part of its gravity, and the weight required to sustain it, is to the weight of the body, as AC the height of the plane, to AB the length of the same. As the force by which a body is made to descend along an inclined plane arises











arises from gravity, it is of the same nature with it, and therefore that force every moment, and in all parts of it, is equal; consequently the motion of a body freely descending along an inclined plane, is analogous to that of a body freely falling; and what has been said of the latter holds good here, and consequently the motion is equally accelerated in equal times.

The forces by which two bodies descend, one of which falls freely, and the other runs down an inclined plane, if they begin to fall at the same instant, are ever to one another in the same ratio as at the beginning of the fall; wherefore the effects of those forces, that is, the spaces gone through in the same time, are in the same ratio, namely, that of the length of the plane to its perpendicular height.

In the plane AB, the space gone through by a body, whilst another falls freely down the height of the plane AC, (*plate I. fig. 8.*) is determined by drawing CG perpendicular to AB; for then the length of the plane AB, is to its height AC, as AC to AG. If a circle be described with the diameter AC, the point G will be in the periphery of the circle; because an angle in a semicircle, as AGC, is always a right one; and therefore a point, as G, taken in any inclination of the plane, will be always in the periphery of the said circle. Whence it follows, that all the chords, as AG, are gone through by bodies running down them, in the time that a falling body would freely descend through the diameter AC, are equal. Through the point C there can be no chord drawn, as HC, but a chord AG may be parallel to it (that is, equally inclined) and equal; therefore, in a semicircle, as AHC, whether a body falls freely along the diameter AC, or whether it falls along any chord as HC, it will in the same time arrive at the lowest point C, of the semicircle. The time of the fall along the whole plane AB, may be compared with the time of the descent along the height AC; which, for that time, is equal to the time of the fall along AG, and so the squares of those times are to one another, as AB to AG: but AB is to AC, as AC to AG; therefore the squares of the lines AB and AC, are to one another, as the times of the fall along AB and AG, or AC; that is, the times, in that case, are as the spaces gone through.

In the same case, the velocities at the end of the descent are equal; for, after equal times, when the bodies are at G and C, the velocities are in the same ratio as in the beginning of the fall, that is, as the forces by which the bodies are impelled, or as AC to AB. When the body descends from G to B, the velocity increases as the time; and the velocity at G is to the velocity at B, as AB to AB; therefore the velocities at B and C have the same ratio to the velocity at G, and so are equal. Hence it appears, that a body acquires the same velocity in falling from a certain height, whether it falls directly down, or along an inclined plane; and, since the angle of inclination causes no alteration, a body may run down several planes differently inclined, and even along a curve, which may be considered as made up of innumerable planes differently inclined; and the celerity acquired will always be the same when the height is equal. Upon this foundation the whole doctrine of pendulums is superstructed.

**ACCELERATIONS of the motion of pendulums.**—The motion of pendulous bodies is accelerated in their descent; but in a less ratio than that of bodies falling perpendicularly. See the laws thereof under **PENDULUM**.  
**ACCELERATION of the motion of projectiles.** See **PROJECTILES**.

**ACCELERATION** is also applied in the ancient astronomy, in respect of the fixed stars. This acceleration was the difference between the revolution of the primum mobile, and the solar revolution, which was three minutes and fifty-six seconds according to computation.

**ACCELERATOR**, in anatomy, the name of two muscles of the penis, which serve for ejecting the urine or semen. See the article **MUSCLES**.

**ACCENDENTES**, a lower order of ministers in the Romish church, whose office is to light and trim the candles.

**ACCENDONES**, in Roman antiquity, a sort of gladiators, whose office was to excite and animate the combatants during the engagement.

**ACCENSI**, among the ancient Romans, a kind of supernumerary soldiers, who served to fill the places of those who were killed or disabled by their wounds.

**ACCENSI forenses**, among the Romans, an inferior order of officers, who attended the magistrates in the manner of our ushers, serjeants, or tipstiffs. They were thus called from *accire*, to send for.

**ACCENSION**, in chemistry, the action of setting a body on fire: thus the accension of tinder is effected by striking fire with flint and steel.

**ACCENT**, or accenting, in reading or speaking: when we raise the tone higher in sounding any particular word or syllable, that word or syllable is said to be accented, or graced with an accent. In hexameters there is a capital accent in every line, easily distinguishable from the rest by a good ear. Thus,

*Nec bene promeritis capitur, nec tangitur ira.*

Accents either in prose or poetry have a double effect: They contribute to the melody, by giving it air and spirit; they contribute not less to the sense, by distinguishing words of importance from others. Accenting is entirely confined to long syllables; for a short syllable is not capable of an accent. Every word in an hexameter line that has a long syllable may be accented, unless the sense interpose, which rejects the accenting a word that makes no figure by its signification. But, notwithstanding this circumstance, there is constantly one accent in every line which makes a greater figure than any of the rest. Thus,

*Smooth flow the waves, the zephyrs gently play,  
Belinda smil'd, and all the world was gay.*

In order to facilitate the reading of dead languages, grammarians have adopted various characters for distinguishing the accents belonging to particular syllables; such as the acute, marked thus, ('), the grave thus (`), and the circumflex thus (^), or (ˆ), &c. The acute denotes that the voice is to be raised; the grave, that it is to be lowered or flattened; and the circumflex, that the syllable is to be lengthened or dwelt upon.

**ACCENT**, in music, is a certain modulation of sounds to express a passion, whether by the voice or instruments. See **MUSIC**.

**ACCENTER**, in music, one of the three fingers in a trio, viz. the person who sings the highest part.

**ACCEPTANCE**, in a general sense, implies the consent of the person who accepts or receives. It is formed from the Latin *acceptio*, which is compounded of *ab*, from, and *capio*, to receive.

**ACCEPTANCE**, in commerce, is the subscribing, signing, and making one's self debtor for the sum contained in a bill of exchange, or other obligation.

**ACCEPTANCE**, in the church of Rome, is put for receiving the Pope's constitutions.

**ACCEPTATION**, in grammar, is the sense or meaning wherein any word is taken. Most words in every language yet known, have several acceptations.

**ACCEPTILATION** in the civil law, implies an acquittance given by a creditor to a debtor, without receiving any money.

**ACCEPTOR**, or **ACCEPTER**, the person who accepts a bill of exchange, &c.

**ACCESS**, from the Latin *accessus*, compounded of *ad*, to, and *cedo*, to succeed, and signifies the approach of one person or thing to another. It is also used by physicians for the beginning of a paroxysm.

**ACCESSARY**, or **ACCESSORY**, in law, a person who is in any wise aiding in the commission of some felonious action.

By statute, he who counsels, abets, or conceals the committing of such an action, or the person who has committed it, is deemed an accessary. Accessaries in petty treason, murder, and felony, are not allowed their clergy. A wife may assist her husband, without being deemed



deemed accessory to his crime; but not *e contra*. A servant assisting his master to escape, is reckoned an accessory; also furnishing others with weapons, or lending them money, &c. will make persons accessories. Persons buying or receiving stolen goods, knowing them to be such, are deemed accessories to the felony. Also if the owner of stolen goods, after complaint made to a justice, take back his goods, and consent to the escape of the felon, he becomes accessory after the fact.

**ACCESSORY**, a name given to a particular nerve by Dr. Willis. It belongs to the eighth pair, and arises by several filaments from both sides of the medulla spinalis of the neck.

**ACCESSIBLE**, something that may be come at, or approached to: thus, we say, such a place is only accessible on one side, &c. With a quadrant you may take the admeasurement of all heights and distances.

**ACCESSION**, a term of various import: thus, among civilians, it is used for the property acquired in such things as are connected with, or appendages of other things: among physicians, it signifies the same with what is more usually called paroxysm: among politicians, it is used for a prince's agreeing to, and becoming a party in a treaty before concluded between other potentates: again, it more particularly denotes a prince's coming to the throne by the death of the preceding king; and lastly, it is used by Romanists for a peculiar way of electing a pope; which is, when one candidate has got two thirds of the votes, the rest are enrolled by accession.

**ACCESSIT**, a term used in some colleges abroad, with regard to the distribution of prizes to scholars who are the next in merit to those who have obtained the prizes.

**ACCIB**, a name given by some authors to lead.

**ACCIDENCE**, a name given to a small book, containing the rudiments of the Latin tongue.

**ACCIDENT**, in a general sense, denotes any casual event.

**ACCIDENT**, among logicians, is used in a three-fold sense. 1. Whatever does not essentially belong to a thing, as the cloaths a man wears, or the money in his pocket. 2. Such properties in any subjects as are not essential to it; thus whiteness in paper is an accidental quality. 3. In opposition to substance, all qualities whatever are called accidents, as sweetness, softness, &c.

**Absolute ACCIDENT**, in the Romish church, an accident which may possibly subsist, at least miraculously, without a subject, which is unintelligible jargon.

**ACCIDENT**, in heraldry, an additional note or mark in a coat of arms, which may be either omitted or retained, without altering the essence of the armour.

**ACCIDENT**, among physicians, is sometimes used for what is more usually called symptom.

**ACCIDENTAL**, in a general sense, an appellation given to such things as happen by accident.

**ACCIDENTAL point**, in perspective, that point in the horizontal line, where all lines parallel among themselves meet the perspective plane.

**ACCIDENTAL dignities and debilities**, in astrology, certain casual dispositions of the planets, whereby they are supposed to be either strengthened or weakened.

**ACCIDENTS**, in astrology, denote the most remarkable occurrences in the course of a man's life: such are, a remarkable instance of good fortune, a signal deliverance, a great sickness, &c.

**ACCIPITER**, in ornithology, the name of a genus of birds, whose distinguishing characteristic is a crooked or hooked bill. This genus is subdivided into three classes, the parrot, the owl, and the hawk kinds. Among the Romans, the term *accipiter* signified a hawk, and which, from its being very carnivorous, they considered as a bird of bad omen.

*Odinus accipitrem, quia semper vivit in armis.* OVID.

Pliny, however, tells us, that in some cases, particularly in marriage, it was esteemed a bird of good omen; because it never eats the hearts of other birds; intimating thereby, that no differences, in a married state, ought to reach the heart.

The accipiter was worshipped as a divinity by the inhabitants of Tentyra, an island in the Nile, being considered by them as the image of the sun; and hence we find that luminary represented in hieroglyphics, under the figure of a hawk.

**ACISSMUS**, in antiquity, implies a feigned refusal of what a person earnestly desires.

**ACISSMUS**, in rhetoric, is a species of irony. See IRONY.

**ACCLAMATION**, a token of joy or applause, whereby the public testify their esteem and approbation.

The word is Latin, *acclamatio*, and compounded of *ad*, to, or at, and *clamo*, to shout, or cry aloud.

The forms of acclamation, among the ancients, were different among different nations. The Hebrews used to cry *Hosannah*, and the Greeks *αγαθη τυχη*, good fortune. Herodotus mentions some magistrates at Athens who were elected by acclamation, though it was not indicated by shouts, but by holding up of hands. The Barbarians testified their approbation by a confused noise or clashing of their arms. Among the Romans there were three different kinds of acclamation, that of the people, that of the senate, and that of the assemblies of the learned.

The acclamations of the people were shewn at the public entries of emperors and generals; at the shews given by the magistrates; and at the triumphs of conquerors. These acclamations were originally nothing more than the confused shouts of the multitude transported with joy; the simple undisguised expressions of public approbation. But, under the emperors, this impetuous motion, to which the people abandoned themselves as it were by enthusiasm, became an art, and a studied harmony; a musician set the tune, and the people giving two cheers, alternately repeated the form of the acclamation. The most common forms were *feliciter, longiorem vitam, annos felices*: those of triumph were verses in praise of the conqueror, the soldiers and people crying out at certain intervals, *io triumphe*.

The acclamations of the senate, though more serious, had the same end, that of honouring, and often flattering, the prince. The forms generally used to testify their approbation of his propositions, were, *omnes, omnes, æquum est, justum est*.

It was customary for men of letters to recite their compositions in the Capitol, or some temple, before a numerous assembly; and the acclamations were there given nearly in the same manner as at the public shews.

**ACCLIVIS**, in anatomy, is the name by which some writers call the *obliquus ascendens*.

**ACCLIVITY**, the rise or ascent of a hill, in opposition to the declivity or descent of it. It is used for the *talus* of a rampart by some writers in fortification.

**ACCLOYED**, in farriery, signifies pricked. Thus a horse's foot pricked in shoeing, is said to be *accloyed*.

**ACCOLA**, among the Romans, signified that a person lived near some place.

**ACCOLADE**, in antiquity, one of the forms of conferring knighthood, in which the prince laid his arms about the neck of the young knight, embraced him, and, some say, gave him a blow on the cheek, neck, or shoulder, in imitation of the form of manumission among the Romans.

**ACCOLEE**, sometimes synonymous with *Accolade*, which see. It is also used in divers senses in heraldry: sometimes it is applied to two things joined; at other times, to animals with crowns, or collars about their necks, as the lion in the Ogilvys' arms; and lastly to kews, battons, maces, swords, &c. placed saltier-wise behind the shield.

**ACCOMMODATION**, making two or more things agree with one another. Among divines, it is applying what is originally said of one person, or thing, to another: thus the words of Isaiah to the Jews of his time, are, by our Saviour, accommodated to his contemporaries, and by St. Paul to his. In law, it signifies the amicable issue of a debate, which is effected sometimes by mediation of friends, sometimes by submission, and sometimes by a division of the subject in debate.

**ACCOMMODATION**, or **ACCOMMODATING**, in geometry,



geometry, is the fitting a line or figure into a circle, &c. agreeably to the conditions of the problem.

ACCOMPANYMENT, in music, is used for the instruments which accompany a voice, to make the musick more full.

Among the moderns, the accompaniment frequently plays a different part or melody, from the song it accompanies; but authors are not agreed, whether or no it was so among the ancients.

ACCOMPANYMENT, in heraldry, denotes any thing added to a shield by way of ornament, as the belt, mantling, supporters, &c. See ACCESSARY.

ACCOMPLISHMENT, is compounded of *ad*, and *compleo*, to finish, or fulfil, and implies, in a general sense, the entire execution or fulfilling of any thing. The accomplishment or completion of the prophecies of the Old Testament, in the person of our Saviour, clearly shews that he was the Messiah. The accomplishment of a prophecy may be done two ways, either directly, or by accommodation: for one and the same prophecy may have several accomplishments at different times: as, for instance, that of our Saviour, touching the destruction of Jerusalem, which must have a second accomplishment in the times which shall immediately precede the last judgment.

ACCOMPLISHMENT, is also used for any mental or personal endowment.

ACCOMPTANT. See ACCOUNTANT.

ACCORD, in musick. See CONCORD.

ACCORD, in law, an accommodation between parties at variance, by means of an offer made by the one, and accepted by the other.

ACCORD, in painting, is the harmony that reigns among the lights and shades of a picture.

ACCORNED, in heraldry: when any figure of an animal, in an escutcheon, has horns of a different colour from those of the real animal, then it is said to be *accorned*.

ACCOUNT, or ACCOMPT, in a general sense, a computation or reckoning of any thing by numbers. Collectively, it is used to express the books which merchants, traders, bankers, &c. use for recording their transactions in business. See BOOK-KEEPING.

ACCOUNT *in company*, is an account betwixt partners relating to the transactions of their joint concern. See BOOK-KEEPING.

ACCOUNT *of sales*, is an account given by one merchant to another, or by a factor to his principal, of the disposal, charges, commission, and nett proceeds of certain merchandises sent for the proper or company account of him that consigned them to such factor or vender. See BOOK-KEEPING.

ACCOUNT *current*,—*of goods*. See BOOK-KEEPING.

ACCOUNT *in bank*, a fund which it is common for merchants or others to furnish themselves with in the cash of a bank, to be in readiness for the payment of bills of exchange, purchases, &c.

*Auditing an Account*, is the examining and passing an account by an officer appointed for the purpose. See AUDITOR.

*Chamber of Accounts*, in the French polity, is a sovereign court of great antiquity, which takes cognizance of, and registers the accounts of the King's revenue. It is nearly the same with the English *Court of Exchequer*; which see.

ACCOUNT *in the Remembrancer's office*, in the exchequer, is the state of any branch of the king's revenue; as the account of the mint, of the wardrobe, of the army, navy, &c.

ACCOUNT, in law, the action that lies against a person who is accountable by office to another, but refuses to render account.

ACCOUNT, is also taken sometimes, in a particular sense, for the computation of time; as we say, The Julian account, the Gregorian account, &c. in which sense it is equivalent to *style*.

ACCOUNT is also used in sundry mercantile forms of expression for advantage, hazard, loss, &c.

ACCOUNTABLE, a term used to denote a person's being liable to render an account for any thing.

VOL. I. No. 2.

ACCOUNTANT, or ACCOMPTANT, in its most extensive meaning, signifies a person skilled in accounts. In a more restricted sense, it is applied to a person, or officer, appointed to keep the accounts of a publick company, or office, as the South-sea, the India company, the Bank, the Excise, &c.

ACCOUNTANTSHIP, the art of keeping and balancing accounts. See BOOK-KEEPING.

ACCOUNTANT-GENERAL, a new officer in the court of Chancery, who by act of parliament is appointed to receive all moneys lodged in court instead of the masters, and, for the sake of being more secure, to convey the same to the bank of England.

ACCOUNTING-HOUSE, counting-house, or compting-house, is a house, or office, set apart by a merchant, or trading-company, for transacting their business, as well as keeping their books, accounts, vouchers, &c.

ACCOUTREMENT, an old term, applied to the furniture of a soldier, knight, or gentleman.

ACCRETION, in physics, the increase, or growth of an organical body, by the accession of new parts.

ACCRETION, in civil law, signifies the property acquired in a vague or unoccupied thing, by its adhering to or following another already occupied; thus, if a legacy be left to two persons, and if one dies before the testator, by right of *accretion*, the legacy devolves to the survivor.

ACCROCHE, in heraldry, signifies a thing's being hooked with another.

ACCROCHING, in old law-books, is incroaching upon, or usurping another man's right.

ACCRUE, in law, any thing that is connected to another as an appendage.

ACCUBATION, in antiquity, the posture used by the Greeks and Romans at table. The body was extended, and the head resting on a pillow, or on the elbow.

The Romans at their meals made use of a low round table, around which two or three couches were placed in proportion to the number of guests; and hence it was called *bichnium*, or *triclinium*. These were covered with a sort of bed-cloaths, and furnished with quilts and pillows for leaning on. The guests reclined on the left side, the first at the head of the bed, with his feet behind the back of the second, &c. Before they came to table, they changed their cloaths, for what they called the *canatoria vestes*, the dining garment, and pulled off their shoes to keep the couch clean.

ACCUBITOR, an ancient officer of the emperors of Constantinople, whose business was to lie near the emperor. He was the head of the youths of the bed-chamber, and had the *cubicularius* and *procubitor* under him.

ACCURSED, denotes something that lies under a curse, or is detestable. It is likewise used for an excommunicated person.

ACCUSATION, in law, the charging any person with a criminal action, either in one's own name, or that of the publick.

ACCUMULATION, in the common acceptation, signifies the amassing or heaping up things together. Among lawyers it is used in speaking of the concurrence of several titles to the same thing, or of several circumstances to the same proof.

ACCUSATIVE, in the Latin grammar, is the fourth case of nouns, and signifies the relation of the noun on which the action implied in the verb terminates; and hence, in such languages as have cases, these nouns have a particular termination called accusative: as *Augustus vicit Antonium*, Augustus vanquished Antony. Here *Antonium* is the noun, on which the action implied in the verb *vicit* terminates; and therefore must have the accusative termination. Ovid, speaking of the palace of the sun, says, *Materiem superabat opus*. The work surpassed the materials. Here *materiem* has the accusative termination; because it determines the action of the verb *superabat*.

In the English language there are no cases, except the genitive, the relation of the noun being shewn by



the assistance of prepositions, as *of, to, from, &c.* By this means we are not embarrassed with the trouble and difficulties attending other languages.

**ACEPHALI**, or **ACEPHALITÆ**, a name given in church history to several sects that were destitute of any head or leader; as also to such bishops as were exempted from the jurisdiction of a patriarch.

**ACER**, in botany, the maple or sycamore tree, a genus of the *polygonia diœcia* class. There are only two species of the *Acer* which are reckoned natives of England, *viz.* the pseudo-platanus, and the campestre.

**ACERIA**, in antiquity, a kind of altar erected near the bed of a person deceased. It was much used among the Romans; and, till the time of the burial, the friends and familiars daily burnt incense on it.

**ACETABULUM**, in antiquity, a little vase or cup used at table to serve up sauces or seasoning. It also denotes a Roman measure, both for liquid and dry things, equal to a cyathus and a half.

**ACETABULUM**, in anatomy, a cavity in any bone for receiving the protuberant head of another, and thereby forming that species of articulation called *enarthrosis*.

**ACETABULUM**, in botany, a species of the *peziza*, or cup-*peziza*, a fungus belonging to the *cryptogamia* fungi of Linnæus. It is *acetabulum* from the resemblance its leaves bear to a cup.

**ACETOSA**, in botany, a synonyme of the *rumex*, or *forrel*.

**ACETOSE**, or **ACETOUS**, a name given to such substances as are sour, or partake of the nature of vinegar.

**ACETUM**, vinegar, the vegetable acid of the chemists.

**ACHATES**, the agate in natural history. See **AGATE**.

**ACHERNER**, is in the southern extremity of the constellation Eridanus, and is a star of the first magnitude.

**ACHILLEID**, or **ACHILLEIS**, a celebrated poem of Statius, in which that author proposed to deliver the whole life and achievements of Achilles; but has only treated of the infancy and education of his hero, being prevented by death from proceeding any further.

*Tendo* **ACHILLES**, in anatomy, is the tendon formed by the tails of several muscles, and inserted into the *os calcis*. It is said Achilles was fatally wounded in that part, before the walls of Troy, and that it took its name from that circumstance.

**ACHOR**, in physic, is a species of the herpes, and appears with a crusted scab formed by a humour somewhat viscid, and resembling ichor, whence the sore itself is called *achor*. It is occasioned by a salt sharp serum oozing through the skin.

**ACHRONICAL**, in astronomy. See **ACRONYCAL**.

**ACID**, a general name for every thing that affects the organs of taste with a pungent sourness.

This property of bodies is generally attributed to a particular class of salts, called acid salts; supposed to be solid spiculæ, sharp-pointed at both ends. Their solidity is inferred from their dissolving the hardest bodies, their sharpness from their pungency on the tongue: and their being pointed at both ends, from their penetrating the hardest substances with ease.

The great characteristic of acid bodies, is, that they make a violent effervescence when mixed with alkaline substances, and turn a blue tincture of violets red; whereas alkaline substances, mixed with the same tincture, turn it green.

The principal acids are vinegar and its spirits; the juices of lemons, oranges, forrel, citrons, &c. also the spirits of nitre, alum, vitriol, sulphur, and sea-salt.

**ACID menstruus**. Vegetable acids will intimately dissolve many vegetable, mineral, and even metallic bodies: thus, horn, bone, shell, and the flesh of animals, are thereby reduced into a transparent liquor.

They likewise act upon all the metals, except gold, silver, and quick-silver. Fossile acids are still more powerful, dissolving the hardest and purest metals, which the vegetable ones will not touch: these are so

strong, as generally to destroy or prove poisonous to animals. Thus, if nitre be ground with an equal quantity of colcothar of vitriol, or burnt alum and then distilled in a strong fire, it will afford a good spirit of nitre, called by the refiners *aqua fortis*, which dissolves silver into extremely bitter, and caustic crystals. Spirit of sea-salt is a solvent for gold, which no other acid in nature will touch. See **AQUA-FORTIS** and **AQUA-REGIA**.

Chemists observe, that the strongest acid menstruum, by dissolving its proper subject, is changed into an insipid, unactive matter, no longer retaining the dissolving power it had before. Hence, it is not improbable, that these acids are generated and destroyed: for no spirit of nitre hath ever been found native, but is always produced from nitre already formed. Therefore these acids in dissolving bodies, concrete therewith, and are changed into new substances.

**General Properties of ACIDS**. All acids agree, 1. In uniting with alkaline substances, making effervescences with them, and producing new kinds of salts. 2. They also agree, in combining with chalk, coral, crabs-eyes, pearl, shells, horn, bone, quick-lime, iron, copper, &c. all which are dissolved quicker or slower by every acid. Now these solutions, except the metallic ones, lose all the acrimony of the dissolving acid: thus, for instance, if spirit of nitre be perfectly saturated with crabs-eyes, this solution will prove a lymphid, and almost insipid liquor; and when diluted with fair water filtered and kept for some time in a gentle heat, it might pass for pure water; but upon adding fixed alkali thereto, the crabs-eyes before dissolved will soon fall to the bottom, and shew that the solution was not pure water. Hence, therefore, we may easily be imposed upon in the judgment we form of water by taking that for pure element, which contains numerous dissolved and dissolving particles. 3. Acids also agree in not only concreting with the subjects they dissolve, but likewise in thereby losing their dissolving power. 4. It is also a property of all acids, to change the colour of vegetable juices into red, as we see in the juice of violets, roses, turnsol, &c. 5. They all agree likewise in this, that they do not so much change the bodies they dissolve, as they are changed by them. 6. All acids may be diluted with water, and united with spirits and oils; thus, spirit of nitre unites with alcohol, though not without conceiving great heat, discharging red fumes, and making a strong and almost fiery effervescence. The same spirit of nitre, upon uniting with oils, generally raises a violent heat, and sometimes a motion productive of fire and flame. By mixing acids with oils, a bituminous, pitchy, or sulphureous matter is commonly produced.

**Their differences**. Acids differ considerably from one another. 1. In regard to strength, or the quantity of true acid with respect to the water they contain: thus, according to Homberg, an ounce of the best vinegar holds but 18 grains of true acid, the rest being water; an ounce of spirit of salt, 73 grains of true acid; an ounce of spirit of nitre, two drams and 23 grains of true acid; and an ounce of oil of vitriol, four drams and 65 grains. 2. In regard to their solvent power. Thus, spirit of nitre scarce touches gold, with a boiling heat, or at most renders it black; but presently dissolves silver; whilst *aqua regia* has the contrary effect. 3. In being differently affected by the bodies they dissolve: thus spirit of vinegar, by dissolving lead, becomes thick and unctuous; which is not the case with spirit of nitre. 4. One and the same acid is variously changed by acting upon different bodies: thus spirit of vinegar may be recovered after dissolving lead, but is irretrievably lost by dissolving iron.

**Inflammability and explosive power of ACIDS**. Not only are pure acids readily set on fire, and even their minute particles dispersed in the interstices of other bodies; but, what is more remarkable, if the acid spirit of nitre be mixed with an equal quantity of any of the aromatic oils, as that of cloves, saffras, turpentine, &c. it instantly bursts into a lucid flame with an excessive ebullition and explosion.

**ACIDS**, in medicine. Not long ago, it was usual among physicians to explain the nature of diseases by the



the doctrine of acids and alkalies; a custom which, however fallen into disrepute, is still followed by some, and that with reason in regard to some particular disorders. Thus, the heart-burn, chlorosis, and other stomatic disorders may be accounted for from a prevailing acid humour, which is corrected by an animal diet, and the use of such vegetables as contain an aromatic oil. Absorbents, volatile salts, and broths, prepared from the flesh of young healthy animals, are likewise recommended.

**ACIDS**, in the materia medica, denote such medicines as are possessed of an acid quality; such are vinegar, spirit of vitriol, &c.

These being powerful antiseptics, are esteemed good in all putrid and malignant diseases, and by their cooling virtue are no less efficacious in inflammatory and feverish cases. However, great care ought to be taken not to administer them in such large quantities, as to corrode the bowels, or coagulate the blood.

Acids are also commended in the plague, and as styptics. Thus vinegar not only serves to stop hæmorrhages, but being sprinkled upon a red-hot tile or iron, corrects the putrefaction of the air.

**ACIDITY**, that quality which renders bodies acid.

**ACIDULÆ**, a name given to those mineral waters which are supposed to be impregnated with some acid; an opinion which later observations have proved to be destitute of foundation. It is however still used as an appellation of cold mineral waters, to distinguish them from those that are hot.

The word is a diminutive of *acidus*, which is formed from the Greek *ἀκμή*, a point or edge.

**ACIDULATED**, a name given to medicines that have an acid in their composition.

**ACINI**, in botany, an appellation applied to grapes or berries growing in clusters, to distinguish them from *baccæ*, or such as grow single.

**ACKNOWLEDGMENT**, is commonly understood of a person's owning or confessing a thing: but, more particularly it is the expression of gratitude for a favor.

**ACKNOWLEDGMENT-money**, in law, implies a sum of money paid to the tenant on the death of his landlord, as an acknowledgment of a new landlord.

**ACLIDES**, among the ancient Romans, a kind of missile weapon with a thong affixed to it, whereby to draw it back. Most authors describe it as a sort of dart or javelin; but Scaliger makes it roundish or globular; with a slender wooden stem to poise it by.

**ACLOWA**, in botany, a barbarous name of a species of colutea. It is used by the natives of Guinea to cure the itch.

**ACME**, or **ACKME**, the top or height of any thing. It is usually applied to the maturity of an animal just before it begins to decline; and physicians have used it to express the utmost violence, or crisis of a disease.

**ACMELLA**, in botany, the trivial name of a species of the verbefina.

**ACNIDA**, in botany, a genus of diœcia pentandria class. There is only one species of it, *viz.* the acnida canabina. It is a native of Virginia.

**ACNUA**, in Roman antiquity, signified a certain measure of land, near about the English rood, or fourth part of an acre.

**ACOEMETÆ**, or **ACOEMETI**, in ecclesiastical history, an ancient order of monks among the eastern Christians, who continued a perpetual course of divine service; so that their churches were never silent.

The word is Greek, *ἀκοιμηται*, compounded of the *α* priv. and *κοιμᾶω*, to sleep.

They obtained this appellation, which properly signifies watchers, not from their never sleeping, but from their performing divine service continually night and day without intermission; for, by dividing themselves into three classes, each company officiated in their turn, and relieved the other.

**ACOEMETÆ** was also a name given to the Stilites, and other monks of Palestine. There is still a kind of Acoemetæ subsisting in the Roman church, generally called the religious of the holy sacrament, who

keep up a perpetual adoration, some or other of them praying before the host day and night.

**ACOLUTHI**, a term applied to persons who were firm and steady in their opinions, and particularly to the stoics, who were remarkably tenacious of their resolutions and principles.

In church-history, the term *acolythus*, or *acolythist*, is peculiarly applied to candidates for the ministry who continually attend the bishops.

**ACONITE**, in botany, the name of a genus of polyandrious plants, called in English wolfsbane, or monkshood. Its flower is of the polypetalous, anomalous kind; being composed of five irregular leaves, resembling in some measure a man's head with a helmet or hood on it. All the species of aconite are extremely acrimonious, thereby occasioning mortal convulsions, or inflammations that end in a mortification.

**ACONTIAS**, in zoology, an obsolete name of the anguis jaculus, or dart-snake, belonging to the order of amphibii serpentes.

**ACONTIAS**, is also a name applied by some writers to a kind of comet or meteor, whose head appears roundish or oblong, and its tail long and slender, like a dart or arrow.

**ACOPIS**, in natural history, a precious stone transparent like glass, and spotted with a gold colour. *Pliny*.

The word is Greek, and compounded of *α*, priv. and *κοπῶ*, labour; because oil, in which it had been boiled, was considered, by the ancients, as a remedy against weariness or lassitude.

**ACORN**, the fruit of the oak.

**ACORN**, a genus of shell fish, of which there are several species.

The shells of these fish are of a longish shape, resembling that of an acorn, and composed of several valves from six to twelve in number; but not moveable like those of the bivalve kind, being fixed to each other by an intermediate substance.

**ACORUS**, in botany, the sweet-smelling flag or calamus, a genus of the hexandria monogynia class. It is a native of this as well as other European countries. There are three varieties of this genus, *viz.* the acorus calamus; the vulgaris, or aromaticus of the shops; and the verus, which chiefly grows in the Indies.

**ACORUS**, in materia medica, a name sometimes given the great galangal.

**ACOUSMATICI**, sometimes also called *Acoustici*, in Grecian antiquity, such disciples of Pythagoras as had not completed their five years probation. See **PYTHAGOREANS**.

**ACOUSTIC**, in general, denotes any thing that relates to the ear, or the sense of hearing.

**ACOUSTIC duct**, in anatomy, the same with meatus auditorius, or the external passage of the ear.

**ACOUSTIC instrument**, an instrument made in the form of a horn, perforated at the small end, to assist hearing.

**ACOUSTIC nerve**, the same with the auditory nerve.

**ACOUSTICS**, with physicians, medicines for curing deafness.

**ACQUEST**, or **ACQUIST**, in law, denotes goods not descended by inheritance, but acquired by purchase or donation.

**ACQUEST** is also popularly used for conquest, or lands acquired by the sword.

**ACQUITTAL**, in law, is a deliverance or setting free from the suspicion of guilt; as one who is discharged of a felony, is said to be acquitted thereof. It is also used to imply a freedom from entries and molestations of a superior lord for service issuing out of lands.

**ACQUITTANCE**, a written release or discharge, for any sum of money, witnessing, that the party has paid the sum.

**ACRE**, the universal measure of land in Britain. An acre in England contains 4 square roods, a rood 40 perches or poles of 16  $\frac{1}{2}$  feet each by statute. Yet this measure does not prevail in all parts of England, as the length of the pole varies in different counties,

and



and is called *customary measure*, the difference running from the  $16\frac{1}{2}$  feet to 28.

ACRID, an epithet applied to such things as are of a sharp, pungent, disagreeable taste.

ACRIMONY, that quality in things which renders them acrimonious to the taste.

ACROAMATIC, or ACROATIC, a name given to those lectures of Aristotle, as were calculated for his favourite disciples and intimate friends; in contradistinction to his exoterical lectures, which were adapted to common hearers.

The word is Greek, *ακροαματικον*, and derived from *ακροαμαι*, to hear.

ACROAMATIC is also used in a more general sense for any thing that is sublime or abstruse: thus we read of Acraomatic philosophy, theology, &c.

ACROMION, in anatomy, the upper part of the scapula.

ACRONYCAL, in astronomy, a term applied to the stars, of which the rising and setting is called *acronyca*, when they either appear above or sink below the horizon at sun-set.

ACROSPIRE, in natural history, &c. the same with *Plumele*, *Plume*, &c. See *PLUME*.

ACROSPIRED, is used in respect of barley; which, in the operation of making malt, is apt, after coming, or sprouting, at the lower, or root end, to become acrospired, or sprouted also at the upper, or blade-end.

ACROSTIC, in poetry, a kind of poetical composition, the verses whereof are disposed in such a manner, as that the initial letters make up some person's name, title, motto, or the like.

ACROTHERIA, in architecture, small pedestals upon which globes, vases, or statues stand at the ends or middle of pediments, or frontispieces. The height of those at the extremes, should be only half that of the tympanum; whereas that in the middle ought to be one eighth part more. See *PEDIMENT* and *TYMPANUM*.

ACROTHERIA likewise denotes the figures placed as ornaments, or crownings, on the tops of churches; and sometimes those sharp pinnacles, standing in ranges about flat buildings, with rails and ballusters.

ACROTHERIA, among antient physicians, a term used to denote the larger extremities of the body, as the head, hands, and feet.

ACROTHERIA is also used for the tips of the fingers, and sometimes for the eminences of the bones.

ACT, in general, denotes the exertion of power; and differs from power, as the effect from the cause.

ACT, among lawyers, is an instrument in writing for declaring or justifying the truth of any thing. In which sense, records, decrees, sentences, reports, certificates, &c. are called *Acts*.

ACTS, also denote the deliberations and resolutions of an assembly, senate, or convocation, as acts of parliament, &c.

ACTS are also matters of fact transmitted to posterity in certain authentic books, and memoirs; such are the Acts of the Apostles, one of the sacred books of the New Testament.

ACT, in the universities, is a thesis maintained in publick, by a candidate for a degree; or, to shew the capacity and proficiency of the student. At Oxford, the time when masters or doctors complete their degrees is also called the *act*, which is held with great solemnity. At Cambridge they call it the *commencement*.

ACT of faith, *auto da fe*, in the church of Rome, a kind of jail delivery, for burning or setting at liberty the prisoners of the inquisition, or heretics, as they are called.

An act of faith is the utmost exertion of priestly tyranny, and a reproach to humanity itself; the tragical part of which, is thus described by those who have seen it. The prisoners being cloathed in proper habits, are carried, in a solemn procession to the place of execution; where there are as many stakes set up as there are prisoners to be burnt, with a quantity of dry furze about them. Those who make profession of dying in the communion of the church of Rome, are first strangled, and

then burnt to ashes; but those who persist in their heresy, are chained to stakes about four feet high, a board being fixed on the top of the stake for that purpose. On this the priests, after repeated exhortations to be reconciled to the church, deliver them over to the devil, who, they tell them, is standing at their elbow to receive their souls, and carry them with him into the flames of hell; which instance of catholic charity is followed by loud shouts from the deluded mob, crying out, *let the dogs' beads be singed*: this they do by holding a bush of flaming furze, fastened to a pole, to their faces, till they are burnt to a coal. At last, fire is set to the furze at the foot of the stake; but the unhappy sufferers are placed so high, that the flame seldom reaches higher than the seat on which they sit, so that they seem rather roasted than burnt.

Such is the wretched death these poor people suffer, and that for no other reason, for crime it certainly is not, than that they cannot swallow all the absurdities of popery! How shocking is the practice! How detestable, beyond expression, the authors and promoters of it! From such a religion, and such diabolical maxims, will not every protestant most fervently pray God to deliver us?

As to those who escape the flames, some are imprisoned, and others obliged to do penance during their lives.

ACT, in dramatic poetry, signifies a certain division, or part of a play, designed to give some respite both to the actors and spectators.

The Romans were the first that divided their theatrical pieces into acts; for no such divisions appear in the works of the first dramatic poets. Their pieces indeed consisted of several parts or divisions, which they called *protasis*, *epitasis*, *catastasis*, and *catastrophe*; but these divisions were not marked by any real interruptions on the theatre. Nor does Aristotle mention any thing of acts in his *Art of Poetry*. But in the time of Horace all regular and finished pieces were divided into five acts.

*Neuve minor, neu sit quinto productior actu  
Fabula, quæ posci vult & spectata reponi.*

The first act, according to some critics, besides introducing upon the stage the principal characters of the play, ought to propose the argument or subject of the piece: the second to exhibit this to the audience, by carrying the fable into execution: the third to raise obstacles and difficulties: the fourth to remove these, or raise new ones in the attempt: and the fifth to conclude the piece, by introducing some accident that may unravel the whole affair.

But is it really necessary that a dramatic piece should consist of neither more nor less than five acts? The abbé Vatri is of opinion, that some pieces may, with propriety, consist only of three acts, and others even of more than five; because it is no ways essential that a tragedy should consist of fifteen or sixteen hundred verses. Among the ancients we find some that have no more than a thousand; and, among the moderns, others which consist of two thousand. In the first case, three intervals or respites would be sufficient; whereas in the second, according to the opinion of the abbé d'Aubignac, five would not be enough: the division into five acts is then an arbitrary rule, which may be violated without scruple. Tragedies, in general, ought indeed to consist of five acts, and Horace had sufficient reason to give a precept for that purpose; but it may be at the same time as necessary for a poet to divide his piece into three, four, or five acts, as to spin out useless acts, which were, perhaps, before too long and embarrassed with episodes, or crowded with incidents not essential to the plot. M. Voltaire has already got the better of that ancient prejudice in his *Death of Cæsar*, which, though an excellent tragedy, consists of no more than three acts; and we have, in the English language, some of the same kind no way inferior to M. Voltaire's.

Acts are divided into scenes; and Vossius remarks, that, among the ancients, an act never contained more than



than seven scenes. We are very sensible that, in order to keep up a proper proportion between the length of the several acts, the number of scenes should not be too much multiplied; but there is no fixed rule as to their number.

ACT of grace, the appellation given to the act of parliament 1696. c. 32. which allows prisoners for civil debts to be set at liberty, upon making oath, that they have not wherewithal to support themselves in prison unless they are alimanted by the creditors upon whose diligences they were imprisoned, within ten days after intimation made for that purpose.

ACTIAN games, *Ludi ACTIACI*, solemn games instituted, or, according to some, only restored, by Augustus, in memory of his victory over Mark Anthony at Actium, held every fifth year, and celebrated in honour of Apollo, since called *Actius*. Hence Actian years, an era commencing from the battle of Actium, called that *Era of Augustus*.

ACTION, in its general sense, implies nearly the same thing with act. See ACT.

Grammarians, however, observe some distinction between *action* and *act*; the former being generally applied to the common ordinary transactions; whereas the latter is used to express those which are remarkable. Thus we say, it is a good *action* to comfort the distressed; it is a generous *act* to deprive ourselves of what is necessary for their sake. The wise man proposes to himself an honest end in all his *actions*. A prince ought to mark every day of his life with some *act* of greatness.

ACTION, in mechanics, the effort which a body or power makes against another body or power, or the effect itself of that effort.

It being necessary in works of this kind to have a particular regard to the common language of mechanics and philosophers, we have given this double definition: but the proper signification of the term is the motion which a body really produces, or tends to produce in another; that is, the motion it would have produced had nothing hindered its effect. All power is nothing more than a body actually in motion, or which tends to move itself; that is, a body which would move itself if nothing opposed it. The action therefore of a body is rendered evident to us by its motion only, and consequently we must not fix any other idea to the word action, than that of actual motion, or a simple tendency to motion. The famous question relating to *vis viva*, and *vis mortua*, owes in all probability, its existence to an inadequate idea of the word action; for had Leibnitz and his followers observed, that the only precise and distinct idea we can give to the word force or action, reduces it to its effect, that is to the motion it actually produces or tends to produce, they would never have made that curious distinction. See FORCE.

M. de Maupertuis, in the memoirs of the Parisian Academy of Sciences for 1744, and in those of Berlin for 1746, lays it down as a general law, "that in the changes made in the state of a body, the quantity of action necessary to produce such a change is the least possible." This principle he applies to the investigation of the laws of refraction, of equilibrium, &c. and even to the ways of acting, employed by the Supreme Being. In this manner M. de Maupertuis attempts to connect the metaphysics of final causes with the fundamental truths of mechanics, to shew the dependance of the collision of both elastic and hard bodies upon one and the same law, which before had always been referred to separate laws; and to reduce the laws of motion, and those of equilibrium, to one and the same principle.

It is remarkable, that of the many philosophers who have treated on the subject of refraction, none should fall upon so simple a manner of reconciling metaphysics with mechanics; since no more is necessary than the making a small alteration in the calculus founded upon M. de Fermat's principle. In reality, according to that principle, the time, that is, the space divided by the velocity, should be a minimum: so, calling the space

run through in the first medium S, with the velocity  $\bar{V}$ , and the space run through in the second medium s, with the velocity, v, we shall have  $\bar{V} + \frac{s}{v} =$  a minimum; that is,  $\frac{S}{\bar{V}} + \frac{s}{v} = 0$ . Now it is easy to perceive,

that the sines of incidence and refraction are to each other as S to  $-s$ ; whence it follows, that those sines are in the direct ratio of the velocities V, v, which is agreeable to M. de Fermat's rule. But in order to have those sines to be in the inverse ratio of the velocities, it is only supposing  $V S + v s = 0$ , which gives  $S \times V + s \times v =$  a minimum, See MINIMUM.

In the memoirs of the academy of Berlin, may be seen the other applications M. de Maupertuis has made of this principle. And we will add, that whatever may be determined with regard to the metaphysical basis of this principle, and even to the conception he has annexed to the quantity of action, it will hold good, that the product of the space by the velocity is a minimum in the most general laws of nature.

ACTION, in poetry, the subject or fable of the poem, or play.

Critics generally distinguish two kinds, the *principal*, and the *incidental*. The principal action is what is generally called the fable, and the incidental an episode. See the article EPISODE.

As poems are divided into epic and dramatic, so each of these has its particular action. That of the dramatic poem ought to be one, intricate, unravelled, and complete: but at the same time much shorter than that of an epic poem.

The action of an epic poem ought to be great, one, entire, marvellous, and of a competent duration.

First, it ought to be great, that is, noble and interesting; a common ordinary adventure not furnishing the instructions intended to be conveyed by an epic poem. The action must be important and heroic. Thus, in the *Æneid*, a hero escaped from the ruins of his country, wanders a long time with the remainder of his fellow-citizens, who had chose him for their leader, and, in spite of Juno's anger, who pursues him without intermission, he arrives in a country which the Fates had promised him; defeats very formidable enemies; and, after surmounting a thousand difficulties, with a sagacity equal to his valor, he there lays the foundation of a powerful empire.

There are two methods of rendering the epic action interesting: the first, by the dignity and importance of the personages; this is the artifice of Homer, who has nothing else important in his models; every other particular might happen to common persons. The second is the importance of the action in itself, as the establishment or abolition of some religion or state; such is the subject chosen by Virgil, and in this he doubtless excels Homer. The action of the *Henriade*, by Voltaire, re-unites, in a pleasing manner, this double advantage. But Milton, in both particulars, excels them all.

F. le Bossu adds a third method for rendering the action interesting, viz. the giving the readers an higher idea of the personages of the poem than what they commonly entertain of mankind; and by comparing the heroes of the poem with the present race of mortals.

The action ought to be one, that is, the poet ought to confine himself to one single illustrious enterprize, executed by his hero, and not take the whole history of his life. The *Iliad* is no more than the history of the anger of Achilles, and the *Odyssey* that of Ulysses's return to Ithaca. Homer would neither describe the entire life of the latter, nor the whole of the Trojan war. On the contrary, Statius, in his *Achilleid*, as well as Lucan in his *Pharsalia*, has heaped together too many single events, in order to give their works the name of epic poems. They may indeed be called heroic, because they treat of heroes; but we must be careful not to confound the unity of the hero with the unity of the action. Epic poetry is not the praise of an hero, whom we propose as a model, but the recital of some great and illustrious action, which is given as an example.



In poetry, as in painting, the unity of the principal action does not hinder us from introducing several particular incidents, and those incidents are called episodes. The design is formed from the beginning of the poem; the hero of it attains his end by surmounting every obstacle; and it is the recital of those oppositions which make the episodes. However, all those episodes depend upon the principal action, and are so connected with it, and so united with each other, that we never lose sight either of the hero or the action which the poet proposes to celebrate.

The action of an epic poem ought to be marvellous; that is, full of bold actions, which have however an air of probability. Such is the intervention of heathen deities in the poems of the ancients, and that of the passions personified in those of the moderns. But though the poet may sometimes go beyond nature, he ought never to shock reason. An action may be either sagaciously or ridiculously marvellous.

With regard to the duration of the action of an epic poem, Aristotle observes, that it is less confined than that of tragedy. The latter ought to be included in the space of one day, or, as they say, between two suns; but an epic poem is not confined in respect to time. In fact, tragedy is replete with violent passions, and nothing that is violent can be of long duration; but virtues and habitudes, which are not acquired instantaneously, are proper for an epic poem, and consequently its action ought to have a greater extent. F. le Bossu lays it down as a rule, that the more violent the passions of the principal persons are, the less time the action ought to last; and consequently that the action of the *Iliad*, the soul whereof is Achilles' anger, lasts but seven and forty days; whereas that of the *Odyssey*, where prudence is the prevailing quality, lasts eight years and a half; and that of the *Æneid*, where the principal personage is a pious and humane hero, nearly seven years. But the rule of the above author is not incontestable, nor are his sentiments, either with regard to the duration of the *Odyssey* or that of the *Iliad*, exact; for though the epopee may include in its narration the actions of several years, yet the critics are generally of opinion, that the time of the principal action, from the place where the poet begins his narration, should not be longer than one year, as the time of the action of a tragedy ought to be at most but one day. Aristotle and Horace, however, say nothing of this matter: but the examples of Homer and Virgil prove it. The duration of the *Iliad* is but forty-seven days: the *Odyssey* does not commence till the departure of Ulysses from the island of Ogygia: and the *Æneid* at the tempest which threw Æneas upon the coast of Carthage. Now, reckoning from these two epochs, the action of the *Odyssey* is but of two months continuance, and that of the *Æneid* one year. It is true that Ulysses, while with Alcinous, and Æneas, while he stays with Dido, relate their past adventures; but these recitals are introduced merely as such, in the duration of the principal action; and the course of years which were taken up by those events make no part of the duration of the poem; as in tragedy, the events related in the protasis, and which only tend to explain the dramatic action, make no part of its duration; therefore the error of F. le Bossu is sufficiently evident.

ACTIONS, in ethics, the voluntary actions of a man, considered in respect to the imputation of their effects in common life.

By voluntary actions we mean those which depend upon the human will, considered as a free agent, without whose determination, caused by some of its immediate acts, and preceded by the knowledge of the understanding, they cannot be performed; and consequently the existence or non-existence of them is in the power of every person.

Human actions, include, in their essence, two particulars; their matter, and their form. The matter comprehends several particulars, as,

1. The physical motion of one of the natural faculties; for instance, of the motive faculty of the sensitive appetite, of the exterior and interior senses, &c. We might also place in this class the acts of the will

themselves, considered simply in their natural existence, so far as they are the effects flowing from a physical faculty.

2. The defect of some physical motion—it is capable of producing; for we are equally obnoxious and punishable for the sins of omission as for those of commission.

3. It is not only our proper motions and habitudes; or the absence of either in our own person, that can constitute the matter of our moral actions; but also the motions, the habits, and their absence, which we find in others, provided the whole could and might be directed by our own will.

4. It is not the action of beasts, or the operations of vegetables, and inanimated bodies in general, that can furnish the matter of any moral action, since these species of beings are susceptible of being directed by our will; and hence we see the reason why the owner of an ox that pushes with his horns, was, by the Levitical law, obliged to make good the damage done by that beast, provided the owner was previously apprised of the vicious nature of that creature.

5. The actions of another, of which we are the passive subject, may be the cause of a moral action; at least so far as we have given room to commit such action. Thus a woman, who has been violated, is considered as in some degree culpable, if she imprudently exposed herself by going to places where she had no real business, and by that means put herself into the power of the ravisher.

The essence of moral actions consists in their imputability, if we may be allowed to apply that term to the quality whereby the effects of voluntary actions may be imputed to the agent as their author; and hence the agent is called the moral cause.

ACTION, in the military art, an engagement between two armies, or different bodies of troops. It is also used to signify some memorable act performed by some officer or commander.

ACTION, in law, the right of demanding, in a legal manner, what is any man's due; or the process brought for recovering the same.

ACTIONS are either criminal or civil.

*Criminal ACTIONS* are to have judgment of death; as murder, robbery, &c. or only judgment for damage to the injured, fine to the king, and imprisonment. Under the head of criminal actions may also be ranked penal actions, which lie for some penalty or punishment, on the party sued, whether it be corporal or pecuniary. Also actions upon the statute, brought on breach of any statute, or act of parliament, by which an action is given that did not lie before; as where a person commits perjury to the prejudice of another, the injured shall have an action upon the statute. And lastly, popular actions, so called, because any person may bring them on behalf of himself and the crown, by information, &c. for the breach of some penal statute.

*Civil ACTIONS* are divided into real, personal, and mixt. Real action is that whereby a man claims a title, lands, tenements, &c. in fee, or for life; and this action is either possessory, or ancestral; possessory, where the lands are a person's own possession or seisin; ancestral, when they were in the possession or seisin of his ancestors. Personal action, is that brought by one man against another, upon any contract for money or goods, or on account of trespass, or other offence committed; and thereby the debt, goods, chattels, &c. claimed. Mixt action, one lying as well for the thing demanded as against the person who has it; and on which the thing is recovered with damages for the wrong sustained; such is an action of waste sued against a tenant for life, the place wasted being recoverable, with treble damages, for the wrong done. All actions seem to be temporary. A real action may be prescribed against in five years after a fine levied, or recovery suffered. Writs of formedon for any title in lands in being, must be sued out within twenty years. Actions of debt, account, detinue, trover, and trespass, are to be brought within six years; of assault and battery within four years; and of slander within two years, after



after cause of action, and not afterwards. However, it ought to be observed, that the right of action in these cases is saved to infants, feme coverts, and persons in prison, or beyond sea, &c. so as they commence their suits within the time limited after their imperfections are removed. Actions may be brought against all persons whatever; but those who are attainted of high treason or felony, or an outlawed or excommunicated person, &c. cannot bring any action till pardoned, absolved, &c. A feme covert may sue with her husband, and infants by their guardians. Action upon the case, a general action which lies for the redress of wrongs and injuries done without force, and which, by law, are not provided against. This at present is the most frequent of all actions, being brought in all cases, where no certain form has been established; and the reason why it is called an action upon the case, is because the whole cause or case is set forth in the writ. It may be brought as well where there is another action, as where no other lies. Action upon the case for words, is brought where a person is injured in his reputation; and for words which affect the life, office, trade, &c. or tend to the loss of preferment in marriage, or otherwise; or to the disinheritation or other damage of a person. Action of a writ, is when a person pleads some matter by which is shewn, that the plaintiff had no cause to have the writ brought, though, perhaps, he may have another writ for the same matter. It is hence called a plea to the action of the writ, in contradistinction from a plea to the action.

ACTION, among physicians, is applied to the functions of the human body, whether vital, animal, or natural. Vital actions are those without which life could not be maintained. Such is the motion of the heart and lungs. Under animal actions are comprehended the senses, imagination, judgment, and voluntary motions, without which we could not live comfortably. Lastly, natural actions, which though not so immediately necessary to life but that we may live some time at least without them, yet are absolutely necessary to our well being; such is digestion.

ACTION, in commerce, is a term used abroad for a certain part or share of a publick company's capital stock. Thus, if a company has 400,000 livres capital stock, this may be divided into 400 actions, each consisting of 1000 livres. Hence a man is said to have two, four, &c. actions, according as he has the property of two, four, &c. thousand livres, capital stock. The transferring of actions abroad is performed much in the same manner as stocks are with us. See STOCKS.

ACTION, in oratory, the expression of the countenance, voice, gesture, &c. and which ought to be accommodated to the subject. Action, says Cicero, is the eloquence of the body; it has two parts, the voice and the gesture; the one strikes the ears, and the other the eyes: the two senses, says Quintilian, whereby we convey our sentiments and passions into the souls of the hearers. Each passion has a tone of voice, and an air and a gesture peculiar and proper to it. The ancients used the word pronunciation in the same sense; Demosthenes considered this as the second requisite in eloquence, laying it down as an acknowledged truth, that a middling discourse delivered with all the force and graces of action, will have a greater effect on the audience than the most eloquent discourse destitute of that powerful charm.

ACTION, in horsemanship, implies the motion of the various parts of a horse in doing his paces, &c.

ACTION of the mouth, in horsemanship, signifies the motion of a horse's mouth in champing on his bit, whereby he throws out a great deal of foam, which keeps his mouth always fresh. It is a mark of fire and vigour.

ACTION, in painting and sculpture, denotes the posture of a statue or picture, serving to express some passion, &c.

ACTIVE, *Activus*, something that communicates motion, or action to another; and in this sense stands opposed to passive. Thus we say an active cause, active principles, &c.

The quantity of motion in the world, Sir I. New-

ton shews, must be always decreasing, in virtue of the vis inertiae, &c. So that there is a necessity for certain active principles to recruit it: such he takes the cause of gravity to be, and the cause of fermentation. Adding, that we see but little motion in the universe, except what is owing to these *active* principles.

ACTIVE in grammar, is applied to such words as express action; and is therefore opposed to passive. The active performs the action, as the passive receives it. In all modern languages, the passive voice is expressed by the participle past joined to an auxiliary verb, as, *I am loved*: but in the Greek and Latin languages, the active and passive voice have each their distinct terminations in the different moods and tenses.

ACTIVE principles, in chemistry, such as are supposed to act without any assistance from others; as mercury, sulphur, &c.

ACTIVITY, in general, denotes the power of acting, or the active faculty. See ACTIVE.

Sphere of ACTIVITY, the whole space in which the virtue, power, or influence of any object is exerted.

ACTIUS, in mythology, a surname of Apollo, from Actium, where he was worshipped.

ACTOR, in general, signifies a person who acts or performs something.

ACTOR, in the drama, is a person who represents some part or character upon the theatre. The drama in its original only consisted of a simple chorus, who sung hymns in honour of Bacchus; so that the primitive actors were only fingers and musicians. Thespis was the first who introduced a *persona* or actor, to ease the chorus by reciting the adventures of some of their heroes. Æschylus introduced a second, and changed the ancient recitals into dialogues. Sophocles added a third, in order to represent the variety of incidents in a more natural manner. And here the Greeks stopped; at least we do not find, in any of their tragedies, above three persons in the same scene, though, in their comedies, they took a greater liberty. The ancient actors were masked, which must have been a great disadvantage to their action, as they were thereby deprived of all the variety of expression the countenance is capable of. Actors were as much honoured at Athens, as they were despised at Rome. The French have, in this particular, adopted the manner of the Romans, and the English that of the Athenians.

ACTRESS, a woman who performs any thing; or one who plays on the stage. Women actors on the stage were unknown to the ancients.

ACTUAL, something that is real and effective, or that exists truly and absolutely. In philosophy, we say, actual heat, or cold; in opposition to virtual or potential. In theology, we say, actual grace, in opposition to habitual grace. So also actual sin is used in opposition to original sin. Actual sin is that committed knowingly, by a person arrived at years of discretion. Original sin is that we inherit by descent, being naturally ingendered of the offspring of Adam. See the ninth article of the church of England.

ACTUARIÆ *Naves*, in antiquity, a sort of ships thus denominated, as being peculiarly contrived for swiftness and expedition; they answer to what the French call *brigantines*.

ACTUARY, or ACTUARIUS, a notary or officer appointed to write the acts or proceedings of a court, or the like. In the eastern empire, the actuarii were properly officers who kept the military accounts, received the corn from the *susceptores*, or store-keepers, and delivered it to the soldiers.

ACTUATE, to bring into act, to put a thing in motion, or to stir up a person to action.

ACTUS, in ancient architecture, a measure in length equal to 120 Roman feet. In ancient agriculture, the word signified the length of one furrow, or the distance a plough goes before it turns.

ACTUS *minimus*, was a quantity of land 120 feet in length, and four in breadth.

ACTUS *major*, or ACTUS *quadratus*, a piece of ground in the square form, whose side was equal to 120 feet, equal to half the jugerum.

ACTUS,



ACTUS *intervicinalis*, a space of ground four feet in breadth, left between the lands as a path or way.

ACUS, in ichthyology, the name of two distinct genuses of fishes; the one called the acus of Aristotle, and the other the acus of Bellonius.

Of the former kind, called in English, the needle-fish or tobacco-pipe fish, there are two species, the larger and smaller. The larger is about a cubit long, and not thicker than a man's finger. It has two very small fins at the gills, and another at the back. Its anus is nearly in the middle of the body.

Of the latter kind, called by us the gar-fish, there are also two species, one with scales, and the other not. The under jaw of this last is longer than the upper one, and both are thick set with sharp teeth. It has only one back-fin, and the tail is forked.

ACUTE, is applied to angles, triangles, cones, &c. See ANGLE.

ACUTE *accent*, in grammar. See ACCENT.

ACUTE in music, an epithet given to sharp or shrill sounds, in opposition to those called grave.

ACUTE diseases, such as come suddenly to a crisis. This term is used for all diseases which do not fall under the head of chronic diseases.

AD, a Latin preposition, signifying *to*, frequently used in composition; and sometimes also prefixed to other terms; as, *ad inquirendum*, *ad jura regis*, *ad octo*, &c.

ADAGE, a proverb, or short sentence, containing some wise observation or popular saying.

ADAGIO, in music, an Italian adverb, signifying softly, leisurely; and is used to denote the slowest of all times, except the grave.

ADAMANT, a name sometimes given to the diamond. See the article DIAMOND. It is likewise applied to the scoria of gold, the magnet, &c.

ADAMI *Pomum*, or *Adam's apple*, in botany, an absolute name of a species of the citrus or orange.

ADAMI *pomum*, in anatomy, the convex part of the first cartilage of the larynx.

ADAMICA *Terræ*, a name given to common red clay, alluding to that species of earth of which the first man is supposed to be made. In natural history, a salt, glutinous, fat, and mucilaginous substance, found at the bottom of the sea, resembling a jelly.

ADAMITES, in church history, a name sometimes used for the descendants of Adam by Seth, who are more usually called *Sethites*. But the name *Adamites* is more particularly used, by ecclesiastical writers, for a sect of ancient heretics, who took upon them to imitate the nakedness of Adam, and pretended to be reinstated in his original innocence.

ADAPTERS, in chemistry, machines for fitting a recipient to the capital.

ADAR, the name of a Hebrew month, answering to the end of February and beginning of March, the twelfth of their sacred, and sixth of their civil year. On the 7th day of it, the Jews keep a fast for the death of Moses; on the 13th, they have the fast of Esther; and on the 14th, they celebrate the feast of Purim, for their deliverance from Haman's conspiracy.

ADARCE, a kind of concreted salts found on reeds and other vegetables, and applied by the ancients as a remedy in several cutaneous diseases.

ADARCON, in Jewish antiquity, a gold coin mentioned in scripture, about the value of which authors are not agreed.

ADARE, a small town of Ireland, in the county of Limerick.

ADARME, in commerce, a small weight in Spain, which is also used at Buenos-Aires, and in all Spanish America. It is the 16th part of an ounce, which at Paris is called the *demi-gros*. But the Spanish ounce is seven *per cent.* lighter than that of Paris. Stephens renders it in English by a *dram*.

ADARTICULATION, in anatomy, the same with diarthrosis. See DIARTHROSIS.

ADATAIS, ADATIS, or ADATYS, in commerce, a muslin or cotton-cloth, very fine and clear, of which the piece is ten French ells long, and three quarters

broad. It comes from the East Indies; and the finest is made at Bengal.

ADCHER, in the materia medica, a name given by some to the *schoenanth*.

ADCORDABILES *denarii*, in ancient law-books, is money paid by the vassal to his lord, in the nature of a fine, upon selling or exchanging a feud.

ADCRESCENTES, among the Romans, denoted a kind of junior soldiers, not unlike our cadets.

ADDER, the vulgar name for the viper. See VIPER.

ADDER's-Tongue, in botany, the English name of the *ophioglossum*.

ADDER *wort*, in botany, a name by which some call bistort, or snake-weed.

ADDICE, ADZE, a sort of crooked axe, used by shipwrights, coopers, carpenters, &c.

ADDICTIO *in diem*, among the Romans, the adjudging a thing to a person for a certain price, unless by such a day the owner, or some other, give more for it.

ADDICTION, in the Roman law, was the making over goods to another, either by sale, or by legal sentence of a court.

ADDITAMENT, a term sometimes used by chemists and physicians for the addition of any new ingredient to increase the strength of a menstruum or composition.

ADDITION, in general, is the joining together or uniting two or more things, or augmenting a thing by the accession of others thereto.

ADDITION, in arithmetic, the first of the four fundamental rules of that art, whereby we find a sum equal to several smaller ones.

The rule for addition of integers, is, to place all the numbers of a like kind under one another; that is, the units under units, tens under tens, hundreds under hundreds, &c. and singly to collect the sums of each. To do this, we begin with the units, and if their sum does not exceed 9, we set it down underneath; but if it exceeds 9, the excess is only to be set down; carrying one to the next row for every ten, and so of the other rows.

For example, if the sums 675 and 982 were given to be added, write either of them under the other, viz. units under units, tens under tens, &c. as follows;

$$\begin{array}{r} 675 \\ 982 \\ \hline 1657 \end{array}$$

Then, beginning with the row of units, I say 2 and 5 make 7, which being less than 9, I write it underneath; after which, passing to the row of tens, I say 8 and 7 make 15, the last of which numbers, viz. 5, is only to be set down, and the other carried to the next row: lastly, proceeding to the row of hundreds, I say, 1 carried and 9 make 10, which added to 6 make 16: this sum is set down whole, as being that of the last row; and thus the sum of both, viz. 1657, is found.

The same method will hold, where there are a great many sums to be added, as in the example annexed:

$$\begin{array}{r} 49583 \\ 26259 \\ 18041 \\ 150 \\ 75 \\ \hline 94108 \end{array}$$

for, finding the sum of the first row to be 18, I set down 8, and carry the one to the next row: the sum of the second row, together with the one carried, I find to be 30, and accordingly set down 0, and carry 3 to the row of hundreds: the sum of the third row, and the 3 carried, being 11, I set down 1, and carry 1: the sum of the fourth row, together with the 1 carried, is 24; so that I set down 4, and carry 2: lastly, the sum of the fifth row, together with the 2 carried, being 9, I set it down. Hence the sum of the whole is 94108.

The



The demonstration of the rule of addition is very easy; depending entirely upon the notation in use, and the axiom, that the whole is equal to all the parts taken together.

**ADDITION of Fractions**, is the finding the sum of two or more given fractions, whether vulgar or decimal.

**ADDITION of Vulgar Fractions**. See the article FRACTION.

**ADDITION of Decimal Fractions**, is performed in the same manner as that of whole numbers, only care must be taken, to place the decimal points always under each other. Thus,

$$\begin{array}{r} 86.2403 \\ 521.058 \\ 2940.706 \\ 3.16 \\ \hline 3551.1643 \end{array}$$

The sum of the first row is 3, which I set down; that of the second row 14, whereof 4 is set down and 1 carried: and so of the rest, as expressed before.

**ADDITION, in Algebra**, is the connecting, or putting together, all the letters or numbers to be added, with their proper signs + or -. See ALGEBRA.

1. To add quantities that are like, and have like signs; add together their coefficients, to the sum of which prefix the common sign, and subjoin the common letter or letters. Thus,

$$\begin{array}{ll} \text{To } +19a & \text{To } -2b \\ \text{Add } +6a & \text{Add } -5b \\ \hline \text{Sum } +25a & \text{Sum } -7b \\ \text{To } 4a + b & \text{To } a - 5x \\ \text{Add } 2a + 8b & \text{Add } 2a - x \\ \hline \text{Sum } 6a + 9b & \text{Sum } 3a - 6x \end{array}$$

2. To add quantities that are like, but have unlike signs, subtract the lesser coefficient from the greater, prefix the sign of the greater to what remains, and subjoin the common letters. Thus,

$$\begin{array}{ll} \text{To } -5a & \text{To } +8b \\ \text{Add } +2a & \text{Add } -2b \\ \hline \text{Sum } -3a & \text{Sum } +6b \\ \text{To } a - 6b & \text{To } 4a - 8b \\ \text{Add } -3a + 2b & \text{Add } -4a + 8b \\ \hline \text{Sum } -2a - 4b & \text{Sum } 0 \end{array}$$

The proof of this rule is easily deducible from the nature of positive and negative quantities. See QUANTITY.

If there are more than two quantities to be added, first add the positive ones together into one sum, and then the negative, by case I; which sums are to be again added, by case II. Thus,

$$\begin{array}{ll} \text{To } \left\{ \begin{array}{l} +5a \\ -8a \\ +9a \end{array} \right\} & \text{To the sum of the positive} \\ \text{add } \left\{ \begin{array}{l} -a \end{array} \right\} & \text{Add that of the negative} \\ & \hline & \text{Sum of all is } +5a \end{array}$$

3. To add quantities that are unlike, set them all down after one another, with their signs and coefficients prefixed. Thus,

$$\begin{array}{ll} \text{To } +4a & \text{To } +a \\ \text{Add } +2b & \text{Add } -7x \\ \hline \text{Sum } 4a + 2b & \text{Sum } +a - 7x \\ \text{To } +4a - 2b & \\ \text{Add } -8y + 4x & \\ \hline \text{Sum } +4a - 2b - 8y + 4x & \end{array}$$

A positive sum, beginning the line, may have the sign + before it, but most commonly has none.

**ADDITION of Fractions**, in algebra. See FRACTION.

**ADDITIONS**, in law, denote all manner of defig-

nations given to a man, over and above his proper name and surname, to shew of what estate, degree, mystery, place of abode, &c. he is.

**ADDITIONS** of degree are the same with title of honour, or dignity, as knight, lord, earl, duke, &c.

**ADDITIONS** of estate are yeoman, gentleman, esquire, and the like.

**ADDITIONS** of mystery or trade are carpenter, mason, painter, engraver, and the like.

**ADDITIONS** of place, or residence, are London, Edinburgh, Bristol, York, Glasgow, Aberdeen, &c.

These additions were ordained to prevent one man's being grieved, or molested, for another; and that every person might be certainly known, so as to bear his own burden.

If a man is of different degrees, as duke, earl, &c. he shall have the most worthy; and the title of knight, or baronet, is part of the party's name, and therefore ought to be rightly used; whereas that of esquire, or gentleman, being as people please to call them, may be used or not, or varied at pleasure.

An earl of Ireland is no addition of honour here: nay, the law-addition to the children of british noblemen is only that of esquire, commonly called lord.

Writs, without the proper additions, if excepted to, shall abate; only where the process of outlawry doth not lie, additions are not necessary. The addition of a parish, not in any city, must mention the county, otherwise it is not good.

**ADDITION of Ratios**, a term sometimes used for Composition of Ratios.

**ADDITION**, in music, a dot marked on the right side of a note, signifying that it is to be sounded or lengthened half as much more as it would have been without such mark.

**ADDITIONS**, in heraldry, some things added to a coat of arms, as marks of honour; and therefore directly opposite to abatements. Among additions, we reckon BORDURE, QUARTER, CANTON, GYRON, PILE, &c.

**ADDITION**, in distillery, a general name given to such things as are added to the wash or liquor while fermenting, to increase the vinosity and quantity of the spirit, or give it a particular relish.

**ADDITIONAL**, in a general sense, denotes something over the usual sum or quantity.

**ADDITIONAL duties**, those charged upon certain commodities, over and above what they were formerly obliged to pay.

**ADDITIVE**, in general, something to be added. Thus, mathematicians speak of additive ratios, astronomers of additive equations, &c.

**ADDRESS**, a term often used to express the skill and property with which an affair is conducted or managed.

An ADDRESS, in a particular acceptation, is a congratulation, petition, or remonstrance, presented to a superior, especially to the king. Addresses of parliament were first set on foot under Oliver Cromwell.

**ADDRESS**, in commerce, is the direction wrote on the back of a letter or packet, containing the names, quality, and place of abode of the person to whom it is to be delivered, with the name of the province, city, or place, where the party resides.

**ADDUCTION**, in anatomy, the motion or action of the adduct muscles.

**ADDUCTORS**, or ADDUCT Muscles, in anatomy, the names of all muscles which pull one part of the body towards another. See MUSCLES of the human body.

**ADELPHIANI**, in church history, a sect of ancient heretics, so called from their leader Adelphius. They keep the sabbath as a fast.

**ADEMPTION**, in law, is the revocation of a donation, or grant, either directly by a deed or writ, or indirectly by otherwise disposing of the subject of it.

**ADENOGRAPHY**, that part of anatomy which treats of the glandular parts.

**ADENOS**, a kind of cotton, otherwise called marine cotton. It comes from Aleppo by the way of Marseilles, where it pays 20 per cent. duty, according to the tariff



of the year 1766. Its valuation, according to the same tariff, is 76 livres 16 sols.

**ADENOSE** *abscess*, a term sometimes used for a hard tumour resembling a gland.

**ADEONA**, in mythology, the name of a goddess invoked by the Romans when they set out upon a journey.

**ADEPHAGIA**, in mythology, the goddess of gluttony, to whom the Sicilians paid religious worship.

**ADEPS**, in anatomy, the fat found in the abdomen. It also signifies animal-fat of any kind.

**ADEPTS**, a term among alchemists for those who pretended to have found out the panacea or philosophers stone.

**ADEQUATE**, something equal to or exactly corresponding with another.

**ADEQUATE** *idea*, signifies a distinct or perfect conception of all the qualities of any object.

**ADESSENARII**, a name first framed by Prateolus, from the Latin verb *addeſſe*, to be present, and given to those that hold that Jesus Christ is really present in the eucharist; but in a manner different from what the Romanists hold.

**ADFFECTED** *Equation* is that where the unknown quantity is found in two or more different degrees or powers. *E. gr.*  $x^3 - px^2 + qx = a - b$ . Where there are three different powers of  $x$ ; viz.  $x^3$ ,  $x^2$  and  $x^1$ .

**ADHESION**, implies the sticking or adhering of two bodies together.

**ADHESION**, among logicians, denotes the maintaining some tenet, merely on account of its supposed advantage, without any positive evidence for its truth.

**ADHESION**, in medicine and anatomy. There are frequent instances of the adhesion of the lungs to the pleura and diaphragm, which occasions many disorders. We also read of adhesions of the intestines, of the dura mater to the cranium, &c.

**ADJACENT**, an appellation given to such things as are situate near, or adjoining to each other.

**ADIANTHUM**, in botany, a plant commonly known by the name of maidenhair. See **MAIDEN-HAIR**.

**ADIAPHORISTS**, or **ADIAPHORITES**, in church history, a name importing luke-warmness, very properly given, in the sixteenth century, to those who embraced the opinions of trimming Melancthon.

**ADJECTIVE**, in grammar, is a word added to a substantive, to express its quality, and in English is not varied on account of gender, number, or case, some few pronominal adjectives excepted, as having the possessive case. "By *one's* own choice." (Sidney.) "Teach me to feel *another's* woe." (Pope, Universal Prayer.) "The *former's* phlegm was a check upon the *latter's* vivacity." (Alluding to Fabius and Minucius.) Adjectives are very improperly called nouns; for they are not the names of things. For instance, the adjectives *good*, *white*, are applied to the nouns *man*, *snow*, to express the qualities belonging to those subjects; but the names of these qualities in the abstract, (that is, considered in themselves, and without being attributed to any subject) are *goodness*, *whiteness*, and these are nouns or substantives.

Qualities for the most part admit of *more* and *less*, or of different degrees: and the adjectives that express such qualities have accordingly proper forms to express different degrees. When a quality is simply expressed, without any relation to the same in a different degree, it is called the positive; as, *wise*, *great*. When it is expressed with augmentation, or with reference to a less degree of the same, it is called the comparative; as, *wiser*, *greater*. When it is expressed as being in the highest degree of all, it is called the superlative; as, *wisest*, *greatest*. So that the simple word, or positive, becomes comparative by adding *r*, or *er*; and superlative by adding *st*, or *est*, to the end of it. And the adverbs *more* and *most* placed before the adjective have the same effect; as, *wise*, *more wise*, *most wise*. Monosyllables, for the most part, are compared by *er* and *est*; and dissyllables, by *more* and *most*; as, *mild*, *milder*, *mildest*; *frugal*, *more frugal*, *most frugal*. Dissyllables ending in *y*, as *happy*, *lovely*; and in *le* after

a mute, as, *able*, *ample*; or accented on the last syllable, as *discreet*, polite; easily admit of *er* and *est*. Words of more than two syllables hardly ever admit of those terminations. In some few words the superlative is formed by adding the adverb *most* to the end of them, as, *nethermost*, *uttermost*, or *utmost*, *undermost*, *uppermost*, *foremost*.

There are as many species of adjectives as there are species of qualities, manners, and relations, which the human mind can consider in the objects.

We do not know the essence of the substances themselves, we know them only by the impressions they make upon our senses; and therefore we give the objects such and such qualities as are proper to the sense those impressions affect: if the eyes are affected, we say that the object is coloured; that it is either white, black, red, blue, &c. If it affects the taste, we denominate it either sweet, bitter, sour, unsavoury, &c. If it regards the sense of feeling, the object is either rough, smooth, hard, soft, fat, oily, dry, &c. Consequently the words white, black, red, blue, sweet, bitter, sour, unsavoury, &c. are so many qualifications given to objects, and therefore so many adjectives; and because these impressions are caused by the action of physical objects upon our senses, we may properly call these words by the name of physical adjectives.

At the same time it will be necessary to observe, that there is nothing in the objects similar to the sentiment they excite in us; all we can infer from hence is, that such objects have the property of exciting in us such a sensation, or such a sentiment, according to the disposition of our organs, and the laws of universal mechanism. A needle, for instance, is such an object, that if the point of it be forced into the skin, the party will feel a sensation of pain; but this sensation will be peculiar to the person affected, and not at all to the needle; we may say the same of every other sensation.

Besides the physical, there are also metaphysical adjectives, which are equally numerous, and from which we might form as many different classes, as there are kinds of contemplations under which the mind may consider physical and metaphysical objects.

As we are accustomed to qualify physical beings, in consequence of the immediate impressions they make upon us; so we also qualify metaphysical and abstract beings in consequence of some considerations of our mental faculty, with respect to these beings. The adjectives that express these species of contemplations are what we call metaphysical adjectives.

**AD INQUIRENDUM**, a judicial writ, commanding inquiry to be made of any thing touching a cause depending in the king's court, for the better execution of justice; as of bastardy, or the like.

**ADJOURNMENT**, in law, the putting off a court, or meeting; and appointing it to be kept at another time or place.

**ADIPOSE**, in a general sense, denotes something belonging to the fat of the body. It is a term chiefly used by physicians and anatomists, in whose writings we read of adipose cells, adipose ducts, adipose membrane, adipose vessels, &c.

**ADIT**, in general, signifies the passage to, or entrance of any thing, as the adit of a mine, &c.

**ADJUNCT**, something added or joined to another. In rhetoric and grammar, it signifies certain words or things added to others, to amplify or augment the force of the discourse.

**ADJUTANT**, in the military art, is an officer whose business it is to assist the major. Each battalion of foot and regiment of horse has an adjutant, who receives the orders every night from the brigade-major; which after carrying them to the colonel, he delivers out to the serjeants. When detachments are to be made, he gives the number to be furnished by each company or troop, and assigns the hour and place of rendezvous. He also places the guards, receives and distributes the ammunition to the companies, &c. and by the major's orders, regulates the prices of bread, beer, and other provisions.—The word is sometimes used by the French for an *aide-du-camp*.

**ADJUTANTS-general**, among the Jesuits, a select number of fathers, residing with the general of the order



der, each of whom has a province or country assigned him, as England, Holland, &c. and their business is to inform the father-general of state-occurrences, in such countries.

**ADMEASUREMENT**, in law, is a writ for the adjusting of the shares of something to be divided.

**ADMINISTRATION**, in a general sense implies the direction of the government.

**ADMINISTRATION**, in law, implies the office of an administrator.

**ADMINISTRATOR**, in law, signifies the person to whom the goods, effects or estates, of one who died intestate are intrusted, and for which he is accountable when required.

**ADMINISTRATRIX**, a woman who acts as administrator.

**ADMIRAL**, *admirallus*, or *admiralius*, in maritime affairs, a great officer, who commands the naval forces of a kingdom or state, and decides all maritime causes. According to Ducange, the Sicilians were the first, and the Genoese the next, who gave the name of admiral to the commanders of their fleets; deriving it from the arabic *amir* or *emir*, a designation applicable to any commanding officer. For sometime past, we have had no lord high-admiral in Britain; that office being executed by a certain number of commissioners, called lords of the admiralty. See **ADMIRALTY**.

**ADMIRAL** also denotes the commander in chief of a single fleet or squadron; or, in general, any flag officer whatever. In the British navy, besides the admiral who commands in chief, there are the vice-admiral, who commands the second squadron; and the rear-admiral, who commands the third squadron. The admiral carries his flag at the main-top-mast-head; the vice-admiral at the fore-top-mast-head and the rear-admiral at the main-top-mast-head. See **FLAG**.

**Vice-ADMIRAL** likewise denotes an officer invested with the jurisdiction of an admiral, within a certain county or district. There are upwards of twenty such vice-admirals in Great-Britain; but an appeal lies from their sentence, or determination to the admiralty-court in London. In France, the admiral is one of the great officers of the crown, general of the marine, and of all the naval forces of the kingdom. From him the captains and masters of trading vessels are obliged to take their licences, passports, commissions, and safe conducts.

The tenth of all prizes belongs to him, and the whole of all fines adjudged in the courts of admiralty. He also has the duty of anchorage, tonnage, &c.

**ADMIRAL** is also an appellation given to the most considerable ship of a fleet of merchant-men, or the vessels employed in the cod-fishery of Newfoundland. This last has the privilege of choosing what place he pleases on the sandy shore, to dry his fish. He also gives proper orders, and appoints the fishing places to those who come after him; and as long as the fishing-season continues, he carries a flag on his main-mast.

**ADMIRAL** in natural history, is the name of a beautiful shell of the voluta kind, greatly admired by the curious. There are four species of this shell distinguished by the names of grand-admiral, vice-admiral, orange-admiral, and extra-admiral. The first is extremely beautiful, of an elegant white enamel, variegated with bands of yellow, which, in some measure, represent the colours of the flags in ships of war. It is of a very curious shape, and finely turned about the head; but its distinguishing character is a denticulated line running along the centre of the large yellow band; and this distinguishes it from the vice-admiral, though the head of the latter is also less elegantly formed. (See plate II. fig. 7. where A is the admiral, and B the vice-admiral.) The orange-admiral has more yellow than any of the others, and the bands of the extra-admiral run into one another.

**ADMIRALTY**, the office of lord-high-admiral, whether discharged by a single person, or by joint commissioners, called lords of the admiralty.

**Court of ADMIRALTY**, a sovereign court held by the lord-high-admiral, or lords of the admiralty, where cognizance is taken of all maritime affairs, whether

civil or criminal, and where the offenders are tried by judge and jury; but in civil cases, the manner is different, the decisions being all made according to the civil law.

**ADMIRATION**, in grammar, a mark or character importing something wonderful, or worthy of admiration. It is marked thus (!).

The word is Latin, *admiratio*, and compounded of *ad*, at, and *miror*, to wonder.

**ADMISSION**, *admissio*, among ecclesiastical writers, denotes the act of a bishop's admitting, or allowing a clerk to be able, or qualified for serving a cure.

**ADMONITION**, in church-history, a part of discipline, which consists chiefly in warning an offender of the irregularities, he is guilty of, and advising him to mend his manners. By the ancient canons, nine admonitions were required before excommunication.

**ADMORTIZATION**, in the feudal customs, implied the reducing the property of lands or tenements to mortmain.

**ADNATA**, in natural history, implies such things as grow upon animal or vegetable bodies, whether inseparable, as hair, wool, horns, &c. or accidental, as the few epistitil plants.

**ADNATA**, in botany, signifies the increase growing on the sides of bulbous roots, as lillies, narcissuses, pancratiums, &c.

**ADNATA Tunica**, in anatomy, is the name of one of the coats or tunics of the eye, otherwise called conjunctiva, and albuginea. In English it is called the white of the eye, and is formed by the tendinous expansions of the muscles which move the eye. See the article **EYE**.

**ADNOUN**, in grammar, the same with adjective.

**ADOLESCENCE**, the flower of youth in the human species; commencing at infancy, and terminating in manhood.

**ADONAI**, one of the scriptural names of the Divine Being.

**ADONAI**, an obsolete name for the anemony. See **ANEMONY**.

**ADONIA**, in mythology, were festivals kept in honour of Venus, and in memory of her beloved Adonis. The Adonia lasted two days; on the first of which the images of Venus and Adonis were carried with great solemnity, in the manner of a funeral; the women following the statues, crying, tearing their hair, and beating their breasts. On the second, they changed the mournings into joy, and sung his praises, as if Adonis had been again restored to life. The Adonia were celebrated by the ancient Greeks, Egyptians, Syrians, Lycians, &c.

**ADONIC**, in ancient poetry, a sort of verse consisting of a dactyle and spondee; and had its name from being originally used in the lamentations for Adonis. Its principal use however among the poets, is to serve as a conclusion to each strophe of Saphic verse.

**ADONIS flos**, in botany, a genus of plants, called in English pheasant's eye, from its having some similitude to the eye of a pheasant. The leaves resemble fennel; the flower is polyandrious and rosaceous, with many germina collected in one head.

**ADOPTIANI**, in church history, a sect of heretics, who maintained that Christ, with regard to his human nature, was not the natural, but the adoptive son of God.

**ADOPTION**, a solemn act, whereby one person makes another his heir; investing him with the rights and privileges of a son.

**ADOPTION**, in a theological sense, denotes an act of God's free grace, whereby those who believe in Christ are accounted the children of God, and entitled to the inheritance of the kingdom of heaven: (Rom. vii. 15. Gal. iv. 4, 5, 6.) *For they are heirs of God, and joint heirs with Christ.* Rom. viii. 17.

**ADOPTIVE**, in general, signifies anything adopted. **ADOPTIVE arms**, in heraldry, or, *arms of adoption*, those which a person enjoys by the gift or concession of another, and to which he was not otherwise entitled.

**ADORATION** is the external homage of the Divine



Divine Being. The word is Latin, *adoratio*, and compounded of *ad*, to, and *os, oris*, the mouth.

It is a part of worship the pagans gave their pretended deities: the posture for this religious regard was putting their hand to their mouth, and kissing it.

Adoration in the holy scriptures, is taken not only for that veneration or worship due to God alone, but likewise for those marks of outward respect which are paid to superiors. Adoration of both kinds is generally attended with bowing the body very low, and sometimes with prostration, or throwing one's self on the earth.

The election of popes is performed two ways, by adoration, and by scrutiny. In election, by adoration, the cardinals rush hastily, as if agitated by some spirit, to the adoration of some one among them, to proclaim him pope. When the election is carried by scrutiny, they do not adore the new pope till he is placed on the altar.

ADOSCULATION, a term used by Dr. Grew, to imply a kind of impregnation, without intromission; and in this manner he supposes the impregnation of plants is effected by the falling of the farina fecundans on the pistil.

ADOSEE, in heraldry, implies any two animals turned back to back.

ADOXA, in botany, the tuberosé moschatel, a low plant of sweet smell, growing in many of the woods of England: its leaves are like those of the fumatory, and the flowers monopetalous. It is called in some parts of the kingdom musk crowfoot.

AD QUOD DAMNUM, in law, a writ directed to the sheriff, commanding him to inquire into the damages which may befall from granting certain privileges to a place, as a fair, market, or the like, religious houses, or corporations, for turning highways, &c.

ADRAMMELECH, in mythology, a deity worshipped by the inhabitants of Sepharvaim. These idolaters burnt their children in the fire to the honour of their idol.

ADRIANISTS, in church history, a sect of heretics divided into two branches; the first were disciples of Simon Magus, and flourished about the year 34. The second were the followers of Adrian Hampstead the anabaptist, and held some particular errors concerning the nature of Christ.

ADSTRICTION, among physicians, implies too great a rigidity and closeness in the excretories of the body, particularly in the pores of the skin.

AD TERMINUM, *qui præterit*, in law, is a writ of entry that lies for the lessor or his heirs, if after the expiration of a term for life or years, granted by lease, the tenant or other occupier of his lands, &c. withholds the same from such lessor.

ADVANCE, in the mercantile style, money paid before goods are delivered, work done, or business performed.

ADVANCED, in a general sense, implies something placed or situated before another.

ADVANCED-DITCH, in fortification, is the ditch surrounding the glacis, or esplanade of the place.

ADVANCED-GUARD, or *vanguard*, in the art of war, denotes the first line or division of an army, ranged or marching in order of battle.

ADVANCED-GUARD is also used in a more limited sense for a small party of horse, stationed before the main-guard.

ADVANCER, among sportsmen, one of the flats, or branches of a buck's attire, between the back antler and the palm.

ADUAR, in the Arabian and Moorish customs, a kind of ambulatory village consisting of tents, which these people remove from one place to another, as suits their convenience.

ADVENT, in the calendar, properly signifies the approach of the feast of the Nativity. It includes four Sundays, which begin on St. Andrew's day, or on the Sunday before or after it.

ADVENTITIOUS, an epithet applied to whatever is joined fortuitously to a body.

ADVENTITIOUS *Fossils*, are those which are found embodied in others, such as shells, &c. in stones.

ADVERB, in grammar, is a word joined to a verb, adjective, &c. and solely applied to the use of qualifying and restraining the latitude of their signification.

The word is Latin, *adverbium*, and compounded of *ad*, to, and *verbum*, a verb, q. d. a word added to a verb.

Adverbs, though very numerous, may be reduced to certain classes, the principal of which are those of order, of place, of time, of quantity, of quality, of manner, of affirmation, of doubting, of comparison, and of interrogation.

ADVERBIAL, something relating to adverbs.

ADVERSARIA, a kind of common-place book, used by men of letters for entering whatever occurs to them worthy of notice either in reading or conversation. The word is Latin, and compounded of *ad*, to, and *verto*, to turn.

Letter of ADVICE, in commerce, implies a letter sent by the drawer of a bill of exchange upon him, or the remitter of goods to his correspondent, informing him that he has drawn such a bill, or sent him such a quantity of merchandize.

No person should either accept or pay a bill of exchange, without such a letter of advice, which should specify the name of the person in whose favor the bill is drawn, the date of the bill, and the sum drawn for.

ADVICE-BOAT, a small vessel employed to carry expresses or orders with the greatest dispatch.

ADULT, an appellation given to any thing that is arrived at maturity. Among civilians, it denotes a youth between fourteen and twenty-five years of age.

ADULTERATION, the act of debasing, by an improper mixture, something that was pure and genuine, as coin, medicine, &c.

ADULTERY, an unlawful commerce between one married person and another, or between a married and unmarried person.

ADULTERY, in the scripture language, is also used to signify idolatry, or the forsaking the worship of the true God for that of an idol.

ADVOCATE, among the ancient Romans, implied a person who undertook the defence of causes, which he pleaded much in the same manner as our barristers, &c. do at present.

The word is Latin, *advocatus*, and compounded of *ad*, to, and *voco*, to call; q. d. a person called in to the assistance of another.

The Romans had a very high opinion of the profession of advocates; so that the seats at their bar were crowded with senators and consuls; and the same voices that commanded the people, were also employed in defending them. The emperors therefore preferred the gown to the sword, giving the advocates the title of Comites, Honorati, Clarissimi, and even Patroni, thinking their clients were not less obliged to them, than the freedmen were to their masters for giving them their liberty. But this order in process of time greatly debased itself, the bar became venal, and the advocates mercenary. The tribune Cincius, therefore, procured a law to be passed, forbidding advocates to take money from their clients; but this was found ineffectual, and the venality of the advocates continued, notwithstanding the utmost efforts of the tribune.

The word advocate is still used in countries where the civil law obtains, for those who plead and defend causes of clients trusted to them. In Scotland there is a college of advocates, consisting of one hundred and eighty persons, appointed to plead all actions before the lords of session.

Lord ADVOCATE, one of the officers of state in Scotland, who pleads in all causes of the crown, or wherein the king is concerned.

ADVOCATE, in ecclesiastical history, signifies a person whose function it was to defend the laws and revenues of the church and its religious communities.

Consistorial ADVOCATES, are officers of the apostolic chamber, who plead in the consistories at Rome.

Fiscal ADVOCATE, in Roman antiquity, was an officer of state under the Roman emperors, who pleaded in all causes wherein the fiscus or treasury was concerned.



**ADVOWEE**, in law, implies the patron of a church, or the person who has a right to present to a benefice.

**ADVOWSON**, in law, implies the right of patronage, or presenting to a vacant benefice.

Advowsons are either appendant or in gross; the former depend upon, and pass as appurtenances to a manor or lands; but the latter is a right of presentation subsisting by itself, and belonging to a person, without any relation to manors or lands. In both cases, however, advowsons are equally the property of the patrons as their landed estate; and may accordingly be granted away by deed or will, and become assets in the hands of executors.

**ADUSTION**, among physicians, the same with inflammation.

**ADYTUM**, in antiquity, the most retired and sacred part of a Pagan temple, into which none but the priests were allowed to enter.

**ADZE**, a kind of axe of a crooked form, used by coopers, shipwrights, &c.

**Æ**, among grammarians, a diphthong, or double vowel, composed of A and E.

The simple E is now generally used at the beginning of words, instead of the diphthong Æ, and therefore, many of the words written by some authors with Æ, will be found in this dictionary under E.

**ÆACEA**, in Grecian antiquity, solemn feasts and games celebrated at Ægina, in honour of Æacus; who, on account of his justice upon earth, was thought to have been appointed one of the judges in hell.

**ÆDILE**, among the ancient Romans, a magistrate, whose chief business consisted in superintending the buildings of all kinds, especially those belonging to the publick, as temples, aqueducts, bridges, &c.

The Ædiles also inspected the highways, and took care that the weights and measures were just, and determined the prices of provisions; took cognizance of debauches that were usual in taverns; punished lewd women, and such as frequented gaming-houses; and kept the orders of the people which were deposited in the temple of Ceres. It was also part of their office to review comedies, and other pieces of wit; and they were obliged to exhibit magnificent games to the people, at their own expence.

**ÆGILOPS**, *Αἰγίολος*, among physicians, an abscess in the corner of the eye, next the nose; or, according to Heister, a small tumour caused by an inflammation or abscess, which in time, by the acrimony of its purulent matter, erodes the external skin, lacrymal ducts, and fat round the ball of the eye; nay, sometimes it renders the neighbouring bones carious to a dangerous degree. This name is also given to a plant, for its supposed virtues against such a distemper.

**ÆGIPAN**, in mythology, an appellation given to the god Pan, from his being represented with the horns, feet, legs, &c. of a goat.

**ÆGIS**, in mythology, a kind of shield made at first, as it should seem, of goat's skin, afterwards of brass, belonging only to Jupiter and Minerva, made terrible by a Gorgon's head upon it. Lactantius tells us, it was made of the skin of the she-goat which nursed Jupiter, and that he first used it against the Titans. It is derived of *αἶξ*, a goat.

**ÆGIOCHUS**, in mythology, a surname of Jupiter, from his having been suckled by a she-goat.

**ÆGYPTIACUM**, in pharmacy, the name of detergent ointment frequently used by surgeons for cleansing old and foul ulcers.

**ÆLURUS**, in Egyptian mythology, the deity or god of cats; represented sometimes like a cat, and sometimes like a man with a cat's head.

**ÆEM**, or **AAM**. See **AAM**.

**ÆENIGMA**, any dark saying or question, where some well-known thing is concealed under obscure language.

**ÆOLIC dialect**, among grammarians, is one of the five dialects of the Greek tongue, used by the inhabitants of Æolia.

**ÆOLIC verse**, in prosody, a verse consisting of an iambus, or spondee, then of two anapests, separated

by a long syllable, and lastly by another syllable. Such is,

*O stelliferi conditor orbis.*

**ÆOLIPILE**, *æolipila*, a hollow metalline ball, in which is inserted a slender neck, or pipe; from whence, after the vessel has been partly filled with water, and heated, issues a blast of wind with great vehemence.

Great care should be taken that the aperture of the pipe be not stopped when the instrument is put on the fire, otherwise the æolipile will burst with a vast explosion, and may occasion no little mischief.

As to the phenomena of the æolipile, they may be accounted for from the rarefaction of the water.

**ÆOLUS**, in mythology, the god of the winds. He was painted by the ancients with swollen blubber cheeks, like one who with main force endeavours to blow a blast; also with two small wings upon his shoulders, and a fiery high-coloured countenance.

ÆQUATION,	} See	EQUATION.
ÆQUATOR,		EQUATOR.
ÆQUILIBRIUM,		EQUILIBRIUM.
ÆQUINOCTIAL,		EQUINOCTIAL.
ÆQUIPOLLENT,		EQUIPOLLENT.
ÆQUIVOCAL,		EQUIVOCAL.

**ÆERA**, in chronology, implies a series of years, commencing from a certain fixed point of time, called epocha: thus we say the Christian Æera, that is, the number of years elapsed since the birth of Christ.

The generality of authors, however, use the terms æra and epocha in a synonymous sense, or for the point of time from which the computation commences. See **EPOCHA**.

**AERIAL**, an epithet applied to every thing partaking of the nature of air, or that is connected with, or belongs to, the air. The word is formed from the Greek *αἴρ*, air.

**AERIAL Perspective**, is the art of giving a due diminution or degradation to the strength of the light, shade and colours of objects, according to their different distances, the quantity of light which falls on them, and the medium through which they are seen.

**AERIANS**, in church-history, a branch of Arians, who, to the doctrines of that sect, added some peculiar dogmas of their own. Aerius was dissatisfied that Eustathius, his former companion, should succeed to a bishopric for which he had been himself a candidate; and thence took occasion to defame the order of bishops as an encroachment upon the priesthood. He admitted none into his sect, but those who lived in continence, and condemned marriage as unlawful.

**ÆREOGRAPHY**, a description of the air.

**ÆREOLOGY**, an account of the nature and properties of the air.

**AEROMANCY**, a species of divination in use among the ancients; and consisted in foretelling future events by means of the air, winds, &c. It is also used for the art of foretelling the future changes of the air and weather by means of barometers, hygrometers, &c.

**ÆREOMETRY**, the science of measuring the air, its powers and properties. This science is now generally called Pneumatics. See article **PNEUMATICS**.

**ÆRUGO**, in natural history, the rust of copper, otherwise called *viride æris*. Ærugo is either natural, as that found about copper-mines; or artificial, like verdigris. See **VERDGRIS**.

**ÆRUGO salis**, a kind of reddish slimy matter, separated from the Egyptian *natrum*; probably a mixture of bitumen and a red earth.

**ÆCHYNOMENOUS**, an epithet applied to what is generally called sensitive plants; because they contract their leaves on the approach of the hand, as if sensible of the touch.

**ÆSCULAPIUS**, in mythology, the god of physic. The poets say he was son of Apollo, by the nymph Coronis; who, afterwards favouring a Thracian youth, named Ischys, was struck through with darts by Apollo: but he, repenting the action, opened her womb, and, taking out the child, called him Æsculapius,



lapius, and committed the care of his education to Chiron.

ÆSTIVAL, something belonging to the summer. Thus the æstival solstice, is the same with the summer solstice.

ÆSTUARY, an arm of the sea running a considerable way into the land.

ÆTHER, the name of an imaginary fluid, supposed by several authors, both ancient and modern, to be the cause of gravity, heat, light, muscular motion, sensation, and, in a word, of every phenomenon in nature. Anaxagoras maintained that æther was of a similar nature with fire; Perrault represents it as 7200 times more rare than air; and Hook makes it more dense than gold itself. Whoever has an inclination to know the various hypotheses concerning æther, may consult Shebbere, Perrault, Hook's posthumous works. *Æt. Erud.* Lips. 1716, Bernouilli's *Cogitat. de gravitate ætheris*, &c. &c.

Before the method of philosophising by induction was known, the hypotheses of philosophers were wild, fanciful, ridiculous. They had recourse to æther, occult qualities, and other imaginary causes, in order to explain the various phenomena of nature: but since the days of the great Lord Verulam, who may be styled the parent of genuine philosophy, a contrary course has happily been followed. He convinced the world, that all knowledge must be derived from experiment and observation; and that every attempt to investigate causes by any other means must be unsuccessful. Since his time, the best philosophers have followed the tract which he pointed out. Boyle, Locke, Newton, Hales, and a few others, in little more than one century, have improved and extended science far beyond what the accumulated force of all the philosophers since the creation had been able to effectuate: a striking proof both of the extensive genius of Bacon, and of the solidity of his plan of investigation.

It must indeed be acknowledged, that there is a propensity in the human mind, which, unless it be properly restrained, has a direct tendency both to corrupt science and to retard our progress in it. Not contented with the examination of objects which readily fall within the sphere of our observation, we feel a strong desire to account for things which, from their very nature, must, and ever will, elude our researches. Even Sir Isaac Newton himself was not proof against this temptation. It was not enough that he had discovered the nature of light and colours, the application of gravity to the motions of the heavenly bodies, &c. he must go further, and attempt to assign the cause of gravity itself. But how does he proceed in this matter? Not in the way of experiment, which had led him to his former discoveries, but in the way of conjecture, which will never lead any man to truth. He had recourse to a subtle elastic æther, not much different from that of the ancients, and by it accounted for every thing he did not know, such as the cause of gravitation, muscular motion, sensation, &c.

Notwithstanding the reputation of Sir Isaac, philosophers have generally looked upon this attempt as the foible of a great man, or, at least, as the most useless part of his works; and accordingly peruse it rather as a dream or a romance, than as having any connection with science. But we are sorry to find, that some late attempts have been made to revive this doctrine of æther, particularly in a dissertation, *De ortu animalium caloris*.

As the revival of an old doctrine becomes in some measure a new one, we shall plead no other apology for inserting a specimen of the method of reasoning employed in this dissertation.

The author makes frequent use of a species of argument termed *dilemma* by logicians. For example, in the first part of the work, after endeavouring to prove that animal heat cannot be owing to fermentation, the motion of the fluids, and other causes that have usually been assigned, he draws this conclusion:—"If none of these causes are sufficient to produce the effect; therefore, by dilemma," says he, "it must be sought for in the nature and action of the nerves."

—This is a new species of dilemma:—If the author had proved, that the cause of heat in animals could not possibly exist *any where*, but *either* in fermentation, the motion of the fluids, &c. *or* in the nerves, after having disproved its existence in all the rest, his conclusion in favour of the nerves would have been just; but, as he has not so much as attempted this, the conclusion is not only false, but ridiculous.

However, upon the authority of this dilemma, the author first gives what he calls a Compend of a *new* doctrine concerning the nerves, and then proceeds to inquire in what manner the nerves produce animal heat: he tells us, "That *thought* (*cogitatio*) and sensation depend upon impulses either on the extremities of the nerves, or the sensorium commune, and the consequent motions produced by these impulses: that these motions are so quick, as to be almost instantaneous: that as all motion is mechanical; therefore *thought*, sensation, and muscular motion, must likewise be mechanical: that such quick motions cannot be produced without the intervention of some extremely elastic power; and, as Sir Isaac Newton has shewn, that the impulses which occasion the different sensations must be owing to an elastic power; therefore the muscular motions of animals must be occasioned by the oscillations of some elastic power." But, says he, "as this elastic power cannot exist in the solid nervous fibres, nor in any inelastic fluid; therefore, by *dilemma*, it must exist in an elastic fluid; and hence also, by the former *dilemma*, this elastic fluid must be seated, either in the nerves, or in their medullary substance."

Here again the author calls Sir Isaac in to his assistance.—"What confirms this opinion," says he, "is the Newtonian æther, which pervades all nature, and which, with a few variations in its modification, Sir Isaac has shewn to be the cause of cohesion, elasticity, gravity, electricity, magnetism, &c. in the following manner. 1. As the rays of light, when reflected, do not touch the solid parts of bodies, but are reflected a little before they reach them, it is plain that the æther not only fills the pores of bodies, but likewise floats upon their surfaces; and hence it becomes the cause of attraction and repulsion.—2. All metals, and inelastic fluids, are non-electrics; on the other hand, all solid bodies, metals excepted, are electrics, *i. e.* proper for accumulating æther. But æther, thus accumulated in such a variety of bodies, may produce various motions in the parts of these bodies, without inducing any change in the bodies themselves. Hence æther, with some variations in its modification, is sufficient to account for all the phenomena of electricity. 3. As iron, by accumulating æther around it, exhibits all the wonders of magnetism; so this magnetical æther is more analogous to the nervous æther of animals than any other kind of it. For, as the magnetical æther passes along iron without changing any part of the iron; so the nervous æther, in like manner, passes along the medullary substance of the nerves, and excites motion in any part that is contiguous with them, without inducing any change in the nerves. 4. The irritability and life of plants, which very much resemble those in animals, cannot be explained by any inelastic cause, and must therefore be attributed to an ætherial one. Lastly, As the common æther is differently modified in each of the substances above taken notice of, and also produces various motions or effects peculiar to each, it likewise varies and has some peculiar qualities when residing in animal bodies; so that the nervous or animal æther is not exactly the same, but differs in some respects from those species of æther which give rise to cohesion, gravity, magnetism, electricity." &c.

Having thus explained the nature and qualities of æther, our author starts a very important question, *viz.* "whence is æther derived; and whether does it leave any body after having once got possession of it?" In answer to this, he observes, "That certain bodies have the power of collecting the electrical matter from every circumjacent body, and of accumulating it



“ it in their pores and on their surfaces, but do not suffer it again to transmigrate into any other body. There are other substances of an opposite nature, which do not accumulate the electric matter, but instantly allow it to pass into others, unless prohibited by an electric. Hence,” says he, “ nothing more is necessary for substances of the former kind, but to be in such circumstances as allow them to accumulate the electric matter. In the same manner,” proceeds our author, “ the nervous æther, which is diffused through every part of nature, flows copiously into the medullary part of the nerves, when no obstacle stands in its way; but, when once it has got there, it keeps firm possession, and never afterwards leaves it. Now,” says he, “ a quantity of æther probably constitutes one of the staminal parts of animal bodies, and increases in proportion to their age and growth: for nothing is more *ridiculous* than to suppose that what is commonly called *the nervous fluid* can be daily wasted by labour and exercise, and daily repaired by a new secretion from the brain. To refute this *vulgar* notion, nothing more is necessary than to say, That it is *one of Boerhaave’s theories*, and *must be false*, as all Boerhaave’s other theories have been proved to be ill-founded! But æther is of a more fixed and determinate nature; whenever it gets possession of any substance, it never forsakes it, unless the texture and constitution of the body itself be changed. Hence,” continues our author, “ the æther of an acid body remains as long as the body continues to be acid; the same observation holds with regard to the æther of an alkaline body: but if these two blended together into a neutral salt, the æther must be likewise changed into a *neutral*; and therefore, in the formation of the medullary or staminal part of animals, the æther which before belonged to, or had the properties of some other substance, is instantaneously changed into animal æther, and remains so till the dissolution of that animal.”

Our author next observes, “ That bodies requires to be in a certain state or condition in order to the formation of an æther that is proper for them. This condition of bodies is called an *excited state*: thus, as sulphur, when fluid, does not receive the electric matter, but, when solid, instantly receives it; in the same manner, the nerves, though properly formed, do not admit an æther adapted to their nature, unless they be in an excited state. Hence,” says he, “ the æther of a *dead*, and that of a *living* person, are very different, although the texture and figure of the nerves be the same. The state necessary for constituting the æther of a living animal, seems to depend on heat and moisture; because these things are absolutely necessary in the constitution of life: and hence,” concludes our author, “ the excited state of the nerves depends on heat and moisture. There are also certain circumstances,” says he, “ which contribute to render the state of the nerves more or less apt for accumulating æther: a spasmodic fever, for example, renders the nerves of the whole body less pervious to the motion of the æther; and hence, in cases of this nature, *health*, and all the *vital functions*, must be injured.”

“ These,” our author observes, “ are the outlines of a *new doctrine* concerning the nature and functions of the nerves;” and, upon this *foundation*, proceeds to give his *new theory* of animal heat.

“ From the foregoing *reasoning*,” says he, “ the heat, as well as all the functions of animals, seem to be occasioned by the oscillations of the nervous æther betwixt the extremities of the sentient nerves and the brain, or, more properly, betwixt the brain and muscles. But electrical æther, as above observed, varies a little from common æther; all inelastic fluids, as was likewise formerly remarked, are non-electrics; and all solid bodies, metals excepted, are electrics: these circumstances,” says our author, “ seem to be owing to the oscillations of the electric matter in bodies. In the same manner,” says he, “ the nature of animals may be such, and the nerves may

be so constituted, as to form an æther adapted to their nature, and to excite those oscillations which occasion animal heat. The wonderful effects of heat and cold upon the nerves,” continues our author, “ confirm this theory: every action, and even life itself, requires a certain degree of heat; for as the heat of the external air is so variable, it was absolutely necessary that animal bodies should be endowed with the faculty of producing a degree of heat suited to their nature, independent of external circumstances: hence we see the reason why the degree of heat so seldom varies in the same species of animals. However, although the nervous æther is always ready for exciting heat by its oscillations; yet, in order to bring about this effect successfully, external *stimuli* are necessary, otherwise the æther would be in danger of *stagnating*, which would occasion sleep, a palsy, and, last of all, death. The most permanent of these *stimuli* is the pulsation of the arteries; which is the reason why heat is so connected with the circulation of the blood, and why many authors have mistaken it for the true cause of animal heat.”

Our author now concludes with observing, “ That by his theory, the varieties of heat in different parts of the body, the heat and flushing of the face from shame, and all the other phenomena of heat in animal bodies, admit of a better explanation, than by any other theory hitherto invented.”

Having thus given a pretty full account of an attempt to explain the most abstruse operations of nature, as nearly as possible in the very words of the author, we cannot deny ourselves the liberty of making a few observations.

To give a formal refutation of this author’s reasoning, is no part of our plan. It is, perhaps, wrong to say that he has *reasoned*; for the whole hypothetical part of his essay is a mere farrago of vague assertions, non-entities, illogical conclusions, and extravagant fancies. His æther seems to be an exceedingly tractable sort of substance: whenever the qualities of one body differ from those of another, a *different modification of æther* at once solves the phenomenon. The æther of iron must not, to be sure, be exactly the same with the nervous æther; otherwise it would be in danger of producing sensation in place of magnetism. It would likewise have been very improper to give the vegetable æther exactly the same qualities with those of animal æther; for, in such a case, men would run great risk of striking root in the soil, and trees and hedges might eradicate and run about the fields. Nothing can be more ludicrous than to see a writer treating a mere *ens rationis* as familiarly as if it were an object of our senses: the notion of compounding the æther of an *acid* and that of an *alkali*, in order to make a *neutral* of it, is completely ridiculous. But if men take the liberty of substituting *names* in place of *facts* and *experiments*, it is an easy matter to account for any thing.

By this method of philosophising, obscurity is forever banished from the works of nature. It is impossible to gravel an ætherial philosopher. Ask him what questions you please, his answer is ready:—“ as we cannot find the cause *any where* else; ergo, by dilemma, it must be owing to æther!” For example, ask one of those sages, What is the cause of gravity? he will answer, “Tis *æther*!” Ask him the cause of *thought*, he will gravely reply, “ The solution of this question was once universally allowed to exceed the limits of human genius: but now, by the grand *discoveries* we have lately made, it is as plain as that three and two make five:—*Thought* is a mere *mechanical* thing, an evident effect of certain motions in the brain produced by the *oscillations* of a subtile elastic fluid called *æther*!” This is indeed astonishing!

Such jargon, however, affords an excellent lesson to the true philosopher. It shews to what folly and extravagance mankind are led, whenever they deviate from experiment and observation in their inquiries into nature. No sooner do we leave these only faithful guides to science, than we instantly land in a labyrinth of nonsense and obscurity, the natural punishment of folly and presumption.

When



When endeavouring to account for that propensity in the human mind which prompts us to attempt the solution of things evidently beyond our reach, we recollected a passage in Swift's works, which explains it in the most satisfactory manner.

"Let us next examine (says the Dean) the great introducers of new schemes in philosophy, and search till we can find from what faculty of the soul the disposition arises in mortal man, of taking it into his head to advance new systems, with such an eager zeal, in things agreed on all hands *impossible to be known*; from what seeds this disposition springs, and to what quality of human nature these grand innovators have been indebted for their number of disciples; because it is plain, that several of the chief among them, both *ancient* and *modern*, were usually mistaken by their adversaries, and indeed by all except their own followers, to have been persons crazed, or out of their wits: having generally proceeded in the common course of their words and actions, by a method very different from the vulgar dictates of *unrefined* reason; agreeing, for the most part, in their several models, with their present undoubted successors in the *Academy of modern Bedlam*. Of this kind were *Epicurus, Diogenes, Apollonius, Lucretius, Paracelsus, Des Cartes*, and others; who, if they were now in the world, tied fast, and separated from their followers, would, in this *undistinguishing* age, incur manifest danger of *phlebotomy*, and *whips*, and *chains*, and *dark chambers*, and *straw*. For what man, in the natural state or course of thinking, did ever conceive it in his power to reduce the notions of all mankind exactly to the same length, and breadth, and height of his own? Yet this is the first *humble* and *civil* design of all innovators in the empire of reason.—Now, I would gladly be informed, how it is possible to account for such imaginations as these in particular men, without recourse to my *phenomenon* of vapours, (*i. e.* æther), ascending from the lower faculties to overshadow the brain, and there distilling into conceptions, for which the narrowness of our mother-tongue has not yet assigned any other name besides that of *madness* or *phrenzy*. Let us therefore now conjecture how it comes to pass that none of these great projectors do ever fail providing themselves and their notions with a number of *implicit disciples*; and I think the reason is easy to be assigned.—For there is a peculiar string in the harmony of human understanding, which, in several individuals, is exactly of the same tuning. This if you can dextrously *screw* up to its right key, and then *strike gently* upon it, whenever you have the good fortune to light among those of the *same pitch*, they will, by a secret necessary sympathy, strike exactly at the same time. And in this one circumstance lies all the *skill* or *luck* of the matter: for if you chance to jar the string, among those who are either above or below your own height, instead of subscribing to your doctrine, they will *tie you fast*, call you *mad*, and *feed you with bread and water*. It is therefore a point of the nicest conduct, to distinguish and adapt this noble talent with respect to the difference of *persons* and of *times*.—For, to speak a bold truth, it is a fatal miscarriage so ill to order affairs as to pass for a *fool* in one company, when in another you might be treated as a *philosopher*: which I desire *some certain gentlemen of my acquaintance* to lay up in their hearts as a very *seasonable innuendo*."

We would not have dwelt so long upon this article, had it not been to guard, as far as our influence extends, the minds of those who may be unacquainted with the genuine principles of philosophy, from being led into a wrong track of investigation.

ÆTHER, in chymistry, a name given to any volatile spirit. The spirit which generally goes by that name is procured by distilling spirit of wine with oil of vitriol, and then precipitating with an alkali. See CHEMISTRY.

ÆTHERIAL, something that participates of the nature of æther.

ÆTHERIAL Oil, in chemistry, a very subtle oil, extracted from plants, &c. by distillation.

ÆTHIOPS Mineral, in chemistry, a preparation of mercury, made by rubbing in a marble or glass mortar equal quantities of quicksilver and flowers of sulphur, till the mercury wholly disappears, and the whole becomes a black powder.

ÆTHIOPS Albus, a preparation of mercury, made by rubbing quicksilver with double its weight of crabs-eyes, or sugar candy, till the whole is blended into one mass.

Dr. Plummer's ÆTHIOPS, a medicine prepared by levigating golden sulphur of antimony with an equal quantity of calomel, till they are well blended together.

ÆTIANS, in church history, a branch of Arians, who maintained that the Son and Holy Ghost are in all things dissimilar to the Father.

ÆTIOLOGY, that branch of physic which assigns the causes of diseases.

ÆTIOLOGY, in rhetoric, a figure of speech, when the orator, in relating an event, also displays the cause from which it proceeded.

ÆTITES, in natural history, a name given to pebbles or stones of any kind, which have a loose nucleus rattling within them, and called in English, the eagle-stone.

So far from being a particular genus of fossils themselves, we find ætitæ among very different genera, as the geodes, heteropyræ, &c. but the most valued of all others, is that formed of all the several varieties of our common pebbles.

As to the formation of ætitæ, naturalists account for it from this consideration, that as the nuclei are coarser and more debased by earth than the rest of the pebble, they must shrink up and contract themselves into a smaller size; by which means, it will be separated from the surrounding crust, and thereby become loose. Many imaginary virtues have been ascribed to these stones, as, they assist women in labour, discover thieves, &c. but from what reason or foundation we know not.

AFFECTED Equations, in algebra. See the article AFFECTED Equations.

AFFECTION, in a general sense, implies an attribute that cannot be separated from its subject. Thus gravity is an affection of all bodies. Philosophers consider the affections of a body as certain modifications produced by motion, by virtue of which the body is disposed after such or such a manner.

AFFECTIONS of the Mind, are the same with passions or inclinations; thus love, hatred, joy, grief, &c. are affections of the mind. Physically, it implies the same with disease: thus the hysterick affection is the same with hysterick disease.

AFFERERS, or AFFERORS, in law, persons appointed in court leets, court barons, &c. to settle, upon oath, the fines to be imposed upon such as have been guilty of crimes arbitrarily punishable.

AFFETTUOSO, or *con AFFETTO*, in the Italian music, implies, that the part is to be played in a tender affecting manner.

AFFIANCE, in law, signifies the natural plighting of troth between a man and a woman, to marry each other.

AFFIDAVIT, signifies an oath in writing, sworn before some person properly authorized. In an affidavit, the time, place of habitation, and addition of the person who makes it, are to be inserted.

Affidavits are chiefly used to certify the serving of processes or other matters, concerning the proceedings in a court; and therefore should set forth the matter of fact to be proved, without taking any notice of the merits of the cause. They are read in courts upon motions, but are not admitted in evidence at trials.

AFFINITY, among civilians, implies a relation contracted by marriage; in contradistinction to consanguinity, or relation by blood.

The word is formed from the Latin, *affinitas*, compounded of *ad*, to, and *finis*, boundary; because the limit or boundary of one family approaches to that of another.

AFFINITY,



**AFFINITY**, in chymistry, implies that natural impulse or attraction which various bodies exert towards each other.

All the experiments hitherto made, concur with daily observation to prove that different bodies, whether principles or compounds, have such a mutual conformity, relation, affinity, or attraction, as disposes some of them to join and unite together, while they are incapable of contracting any union with others. This effect, from whatever cause it flows, enables the chymist to account for, and connect together, all the phenomena that his art produces.

**AFFINITY**, is also used to denote a conformity, or agreement, between two or more things: thus we say, the affinity of language, the affinity of words, the affinity of sounds, &c.

**AFFIRMATION**, in a general sense, implies the solemn attestation of the truth of some fact.

**AFFIRMATION**, among logicians, is the act of the mind asserting the truth or reality of something; or a positive proposition, declaring certain proportions or qualities to belong to the thing in question. It is also used for the ratifying or confirming the sentence, or decree, of some inferior court: thus, we say, the house of lords affirmed the decree of the lord chancellor, or the decree of the lords of session.

**AFFIRMATION** also denotes a solemn attestation of the truth of some fact, which the Quakers are allowed in all cases, except criminal cases, to make instead of an oath.

**AFFIRMATIVE**, in a general sense, implies any thing that denotes an affirmation.

**AFFIRMATIVE Quantity**, in algebra, is a real or positive quantity; it is greater than nothing; and therefore opposed to a privative or negative quantity, which is less than nothing.

**AFFIRMATIVE Sign or Character**, in algebra, is marked thus +, and signifies that the quantity to which it belongs has a real existence.

**AFFIX**, among grammarians, denotes much the same with prefix.

**AFFORESTING**, in our old law books, implies the turning lands into a forest.

**AFFRAY**, in law, formerly signified the affrighting or terrifying others; but at present it denotes a skirmish between two or more persons.

**AFFREIGHTMENT**, the freight or hire of a ship.

**AFRICA**, one of the four principal divisions of the earth; divided from Europe on the N. by the Mediterranean sea; from America on the W. by the Atlantic ocean; from the countries towards the south-pole, by the Great South-sea; from the island of Madagascar in the E. by the Mozambique channel; and from Asia also on the E. by the Red-sea. It is also joined to Asia by a narrow neck of land betwixt the Mediterranean and Red-sea, called the *Isthmus of Suez*. Hence Africa is a peninsula somewhat resembling a pyramid, whose base from Tangier to the Isthmus of Suez is about 2000 miles; its perpendicular, from the vertex at the Cape of Good Hope to Buria, 3600 miles; and from Cape Verd, to Cape Guard a Fui, it is 3500. The situation of this quarter on the globe is betwixt 35. o. S. and 36. o. N. lat. and betwixt 17. 35. W. and 17. 35. W. and 53. 21. E. long. Hence it lies, for the most part, within the tropics; by which means, in many places, the heat is almost insupportable. Along the coasts, it is in general reckoned abundantly fruitful, and its produce excellent.

**AFFRONTTEE**, in heraldry, implies two animals facing each other.

**AFT**, in the sea language, the same with abaft. See **ABAST**.

**AFTER-BIRTH**, in midwifery, signifies the secundines, placenta, or membranes surrounding the infant in the womb.

**AFTER-MATH**, in husbandry, denotes the herbage that springs up after mowing, &c.

**AFTER-PAINS**, in midwifery, are the pains felt in the groin, loins, &c. after a woman is delivered.

**AFTER-SWARMS**, in the management of bees, im-

plies those swarms which leave the hive some time after the first have swarmed. See **BEE**.

**AGA**, among the Turks, implies a great lord or commander.

**AGANIPPIDES**, in ancient poetry, a name given to the muses, from a fountain in mount Helicon, called Aganippe.

**AGAPE**, in ecclesiastical history, the love-feast, or feast of charity, in use among the primitive Christians, when a liberal contribution was made by the rich to feed the poor,

The word is Greek, and signifies love.

St. Chrysostom gives the following account of this feast, which he derives from the apostolical practice. He says, the first Christians had all things in common, as we read in the Acts of the Apostles; but when that equality of possessions ceased, as it did even in the Apostles time, the agape, or love-feast, was substituted in the room of it. Upon certain days, after partaking of the Lord's Supper, they met at a common feast; the rich bringing provisions, and the poor, who had nothing, being invited.

It was always attended with receiving the Holy Sacrament; but there is some difference between the ancient and modern interpreters as to the circumstance of time; viz. whether this feast was held before, or after, the communion. St. Chrysostom is of the latter opinion; the learned Dr. Cave of the former.

These love-feasts, during the three first centuries, were held in the church: but at length such abuses were committed at them, that the councils of Laodicea and Carthage prohibited that practice for the future.

**AGAPETÆ**, in ecclesiastical history, young maidens who frequented the company of ecclesiastics from a motive of piety and charity. But this custom afterwards degenerating into libertinism, the agapetæ became a term of reproach.

The word is Greek, and signifies well-beloved. It is derived from αγαπω, to love.

**AGARIC**, in botany, a genus of epistitial plants growing on the trunks of several trees.

The agaric kept in the shops grows on the larch tree; but it is now very seldom used.

**AGATE**, in natural history, a precious stone resembling the onyx with regard to colour; but has no zones wherewith the onyx is decorated. Instead of these the agate has lines or spots of various colours, disposed in such a manner, as to represent the pictures of different objects, as woods, rivers, fruits, flowers, herbs, clouds, &c. though not very distinctly.

**AGATE**, is also the name of an instrument used by gold and silver wire-drawers, so called from the agate placed in the middle of it, and which forms the principal part of the tool.

**AGE**, in a general sense, denotes a certain portion, or part of duration, applied to the existence of particular objects: thus we say, the age of the world, the age of Rome, &c. that is, the time, or number of years, elapsed since the creation of the world, or the building of Rome. Thus, also, a man's age is the time he has lived, or the number of years elapsed since his birth; and so in other instances, as the age of a house, the age of a tree, &c.

**AGE of the World**. Chronologers are far from being agreed with respect to the age of the world, some making it more, some less. Chronologers and historians have divided the time preceding the birth of Christ into six ages. The first, extends from the creation to the deluge, and contains 1656 years. The second, from the deluge to Abraham's coming into the promised land, in the year of the world 2095, and contains 439 years. The third, from Abraham's settling in the promised land to the deliverance of the Hebrews out of Egypt, in the year of the world 2525, containing 430 years. The fourth, from the going out of Egypt to the foundation of Solomon's temple, in the year of the world 2992, containing 467 years. The fifth, from the foundation of the temple to the Babylonish captivity, in the year of the world 3416, containing 424 years. The sixth, from the Babylonish captivity to the birth of Christ,



Christ, in the year of the world 4000, and four years after the vulgar æra, including 584 years.

The ages of the world may very naturally be reduced to the three following grand epochas. 1. The age of the law of nature, or from Adam to Moses, which, according to the Jews, consisted of 2447 years; according to Scaliger 2452; and according to Usher, of 2513. 2. The age of the Jewish law, or from Moses to Christ. This, according to the Jews, consisted of 1312 years; according to Scaliger, of 1508; and according to Usher, of 1491. 3. The age of grace, or from Christ to the present time, of which there have elapsed 1778 years; but this is also disputed by chronologers; for if we follow Petavius, who places the birth of Christ four years before the vulgar æra, the current year should be 1783; according to Capella, 1785; and according to Baronius and Scaliger, 1782.

To these computations of the ages of the world, we shall add another, from the learned Mr. Jackson's Chronological Antiquities, who has carefully investigated the different epochas, and shewn the reasons on which his computations are founded. From the creation to the deluge, 2262 years; from the deluge to the birth of Abraham 1072; from the birth of Abraham to the exodus, 505; from the exodus to the foundation of the temple, 579; from the foundation to the destruction of the temple by Nebuchadnezzar, 428; from the destruction of the temple to the decree of Cyrus, 51; and from the decree of Cyrus to the birth of Christ, 535. So that the interval between the creation and the birth of our blessed Saviour consists of 5432 years.

The ancient historians divided the time elapsed since the beginning of the world into three periods, which they called ages. The first reaches from the creation to the deluge, which happened in Greece during the reign of Ogyges: this they stiled the obscure or uncertain age; because the history of mankind is altogether uncertain during that period. The second they named the fabulous, or heroic age; because it is the period in which the fabulous, accounts of their gods and heroes are said to have been performed: it began at the Ogygian deluge, and extended to the first Olympiad; where what they called the historical age commenced.

The ancient Romans divided the time into three ages. 1. The obscure or uncertain age, which terminated at the time of the deluge in Greece, which happened in the reign of Ogyges, king of Attica.—2. The heroic or fabulous age, which terminated at the first Olympiad.—3. The historical, which began at the building of Rome.

The East-Indians also divide the time since the creation into four ages, but their accounts are very extravagant. The first, they represent as a kind of golden age, which, they say, continued 1,782,000 years. In this age the god Brahma was born, the men were all giants, exempt from diseases, and lived in a state of innocence, to the age of 400 years. In the second age, which continued 1,292,000 years, their god Rajas was born, vice crept into the world, mens lives were reduced to 300 years, and their size retrenched proportionally. During the third age, which lasted 864,000 years, vice increased, and men only attained to 200 years. The fourth is the present, or that in which we now live, of which 4851 years are already elapsed, and the life of man sunk no less than one fourth of its original duration. These numbers added together, amount to 3,888,851 years, which, according to them, have elapsed since the creation.

AGE, is also used by historians to signify a century, or period of a hundred years.

*Poetical AGES.* The poets have divided the interval since the formation of man into four ages, which they have distinguished by the epithets of *golden*, *silver*, *brazen*, and *iron*. During the *golden age*, Saturn reigned in heaven, and justice and innocence in this lower world. The earth then yielded her productions without culture, and streams of milk and honey flowed in every part. The *silver age* commenced when men began to deviate from the paths of virtue; and, in consequence of this deviation, their lives were rendered

less happy. The *brazen age* began when the virtue and happiness of men were still more diminished; and this gave place to the *iron age*, which commenced when men had deviated still farther from the paths of virtue and happiness. Such is the system which Hesiod, in his treatise intitled, *Works and Days*, has given more at large; and where the poet has represented, in a very instructive allegory, the melancholy consequences which always flow from injustice.

AGE, in law, signifies a certain period of life, when persons of both sexes are enabled to do certain acts, which for want of years and discretion they were incapable of before: thus, a man at twelve years of age ought to take the oath of allegiance to the king in a leet: at fourteen, which is his age of discretion, he may marry, choose his guardian, and claim his lands held in socage.

Twenty-one is called full age, a man or woman being then capable of acting for themselves, of managing their affairs, making contracts, disposing of their estates, and the like; which before that age they could not do.

A woman is dowable at nine years of age, may marry at twelve, and at fourteen choose her guardian.

If a man or woman acts in any of the above-mentioned capacities before the time prescribed by law, he or she may retract at that time, otherwise they are supposed to agree it anew, and it shall be deemed valid. Thus, if a man marries before fourteen, or a woman before twelve, they may either agree to the marriage or not, at these several ages; and so on in other cases.

At fourteen, a man may dispose of his personal estate by will, but not of lands. At this age too a man or woman is first capable of being a witness, and under it persons are not generally punishable for crimes, though they must satisfy the damage sustained by trespass committed by them.

AGE of a horse, the time elapsed since the animal was foaled: this is easily known by his mouth till he is eight years old, when the mark wears out. The first that grow are his foal-teeth, which begin to appear some few months after he is foaled. At about two years and a half old, he casts the four middlemost of his foal-teeth, viz. two above and two below; though some do not cast their foal-teeth till near three years old. The new teeth are easily distinguished from the foal-teeth, being much stronger. When he is about three and a half, or in the spring before he is four years old, he casts four more of his foal teeth, viz. two above and two below, one on each side of the nippers or middle teeth. The tushes appear about this time, sometimes sooner, and sometimes not till a horse is full four years old. When a horse comes five, or rather the spring before he is five, the corner teeth begin to appear, and are at first but just equal with the gums, being filled with flesh in the middle. The tushes are also by this time grown to a more distinct size, though not very large; they also continue rough and sharp on the top and edges. The middle teeth arrive at their full growth in less than three weeks; but the corner teeth grow leisurely, and are seldom much above the gums till the horse is full five.

The corner teeth in the upper jaw fall out before those of the under; so that the upper corner teeth are seen before those below: on the contrary, the tushes in the under jaw come out before those of the upper.

When a horse is full six years old, the hollowiness on the inside begins visibly to fill up, and that which was at first fleshy, grows into a brownish spot, not unlike the eye of a dried garden bean, and continues so till he is seven, with only this difference, that the tooth is more filled up and even, and the mark or spot becomes faint, and of a lighter colour. At eight the mark in most horses is quite worn out, though some retain the vestiges of it for a long time; and those who have had a good deal of experience may sometimes be deceived, and take a horse of nine or ten years old for one of eight. It will be unnecessary to take particular notice of the tricks used by dealers, in order to make a false mark in a horse's mouth; because those who are acquainted with the true marks, will easily discover the cheat.



**AGE of the Moon**, in astronomy, is the number of days elapsed since her last conjunction with the sun, or day of her change. See the article **MOON**.

**AGE-PRIER**, *Ætatem Precari*, is when an action being brought against a person under age, for lands descended to him, he, by motion or petition, shews the matter to the court, praying the action may be stayed till his full age; which the court generally agrees to. However, as a purchaser, a minor shall not have his age-prier; nor in any writ of assize, of dower, or petition; but he may in any action of debt.

By the civil law the case is otherwise, an infant or minor being obliged to answer by his tutor or curator.

Among the Romans it was unlawful to put up for any public office, or magistracy, unless the candidate had attained to a certain age; which differed according to the offices sued for. Hence the phrases consular age, prætorian age, &c.

**AGEMOGLANS**, **AGIEMOGLANS**, or **AZAMOGLANS**, in the Turkish customs, are Christian children raised every third year, by way of tribute, from the Christians tolerated in the Turkish empire.

The collectors of this odious tax use to take one child out of three, pitching always upon the most handsome.

The word *agemoglan*s properly signifies a barbarian's child; and out of their number, after being circumcised, and instructed in the religion and language of their tyrannical masters, are the janissaries recruited. As to those who are thought unfit for the army, they are employed in the lowest offices of the seraglio.

**AGENDA**, among philosophers and divines, signifies the duties which a man lies under an obligation to perform: thus we meet with the agenda of a Christian, or the duties he ought to perform, in opposition to the credenda, or what he ought to believe.

**AGENT**, in mechanics, implies a power which acts upon other bodies by virtue of its own motion; and by that action, causes or effects some change in the former.

**Moral AGENT**, a rational creature, capable of regulating his actions by some certain rule.

**AGENT**, among merchants, signifies a person entrusted with some affair, or one who transacts the business of another.

**AGEOMETRIA**, something not founded on the principles of geometry.

**AGGLUTINANTS**, in pharmacy, medicines of a glutinous or viscous nature.

Surgeons use the word to signify all kinds of topical remedies of a glutinous nature.

**AGGREGATE**, the sum or total of several things added together.

**AGGREGATION**, in natural philosophy, implies a species of union, whereby several things, not naturally connected, are collected together, so as to form one whole.

**AGGRESSOR**, in law, the person who began the quarrel, or gave the first assault.

**AGIADES**, in the Turkish armies, are a kind of pioneers employed in fortifying the camp, &c.

**AGJO**, in commerce, a term much used in Holland and Venice, to signify the value between the bank stock and the current coin.

**AGISTMENT**, or **AGISTATION**, in law, implies the taking in of other people's cattle to graze at so much per week.

**AGISTOR**, the person who has the care of cattle taken in to be grazed in the king's forests, &c.

**AGITATION**, in philosophy, is a kind of earthquake, whereby the earth is shaken or agitated.

**AGLEETS**, among botanists, the same with apices. See the Article **APICES**.

**AGNOETÆ**, in ecclesiastical history, a sect of hereticks, so called on account of their maintaining that Christ, with respect to his human nature, was ignorant of many things, and particularly of the day of judgment; an opinion which they built upon the text, Mark xiii. 32. whereof the most natural meaning is, that the knowledge of the day of judgement does not concern our Saviour, considered in the character of Messiah.

**AGNOMEN**, in Roman antiquity, a kind of fourth or honorary name, given to a person on account of some extraordinary action, virtue, or other accomplishment.

**AGNUS** the lamb, in zoology, the young of the sheep-kind.

**AGNUS castus**, in botany, &c. a name given to the vitex, on account of its efficacy in preventing loose venereal desires, pollutions, &c. During the feast of Ceres, the Athenian ladies, who made profession of chastity, lay upon the leaves of *agnus castus*: and to this day the monks and nuns are said to use them for the same purpose.

**AGNUS Dei**, in the church of Rome, a cake of wax, stamped with the figure of a lamb supporting a cross.

These being consecrated by the pope with great solemnity, and distributed among the people, are supposed to have great virtues; as to preserve those who carry them worthily, and with faith, from all manner of accidents, to expel evil spirits, &c.

What an admirable expedient to drain the purses of the credulous laity, and fill those of the clergy!

**AGNUS Dei** is also a popular name for that part of the mass, where the priest strikes his breast thrice, and says the prayer beginning with the words *agnus Dei*.

**AGNUS scythicus**, in natural history, the name of a fictitious plant, resembling a lamb, said to grow in Tartary.

Kæmpfer, who was in the country, could not, by the most diligent enquiry, find any account of it; and therefore concludes the whole to be a fiction.

**AGONALIA**, among the ancients, were festivals celebrated in honour of Janus, or the god Agonius, whom the Romans invoked before they undertook any affair of importance.

**AGONETHETA**, among the ancient Greeks, was the president or superintendant of the sacred games.

**AGONY**, among physicians, denotes extreme pain, or the utmost efforts of nature struggling under a disease.

**AGONYCLITÆ**, in ecclesiastical history, a sect of Christians who always prayed standing, thinking it unlawful to kneel; they flourished in the seventh century.

**AGRARIAN Laws**, among the ancient Romans, those relating to the division and distribution of lands; of which there were a great number: but that called the Agrarian law, by way of eminence, was published by Spurius Cassius, about the year of Rome 268, for dividing the conquered lands equally among all the citizens, and limiting the number of acres which each citizen might enjoy.

Harrington, in his *Oceana*, thinks an agrarian law the only basis of liberty: through the want of which, or the non-observance of it, the commonwealth of Rome came to ruin. He likewise lays down the plan of an agrarian law for England, whereby no man should be allowed to possess more than 2000l. a year in lands.

**AGREEMENT**, in law, signifies the consent of two or more persons to any thing done.

**AGRICULTURE**, in a general sense, implies the art of rendering the earth fertile by tillage and culture.

The word is Latin, *agricultura*, and compounded of *ager*, a field, and *colo*, to till. Agriculture is a no less honourable than profitable art, held in the highest esteem among the antients, and equally valued by the moderns.

If we look into the earliest accounts of the eastern nations, their magnificent and populous cities, and their numerous armies, we shall have sufficient reason to think, that agriculture was then arrived at considerable perfection; since it could supply the inhabitants in general with all the necessities of life, and the great with the most delicate luxuries. This will appear still more evidently, if we reflect on the judicious conduct of the Egyptians, in the disposition of their country, with respect to the inundations of the Nile, and the great advantages they had been taught to reap from it, as described by Herodotus. The possessions of the children of Israel must have been cultivated with the utmost skill and assiduity, or they could never have afforded sustenance to the prodigious numbers of people, who,



as indisputable authority informs us, inhabited that small spot: but time has robbed us of their knowledge in this most useful of all arts.

In the most enlightened ages, books of husbandry were composed by men whose exalted station sufficiently indicates the high value then set upon the art they taught. Xenophon, equally distinguished in philosophy and in arms, shews, by his commendations of Cyrus, the estimation in which agriculture was held by both those great men. Hieron, king of Syracuse, did not think it beneath his dignity to write upon this essential art, for the benefit of his subjects. The chiefs of the two greatest republics in the world, Cato, consul of Rome, and Mago, suses of Carthage, employed part of their time in teaching the art of husbandry. These pieces are, in the opinion of the ancients, the best calculated for explaining rural affairs. Amidst the Asiatic luxury, and that of the Roman empire, valuable treatises of husbandry appeared, written by Attalus, king of Pergamus; by Archelaus, king of Cappadocia; by Valerius Asiaticus, who was judged worthy of the empire, after the death of Caligula; and by the emperor Albinus.

Some few fragments of the Greeks are the first rudiments of husbandry upon record; and the elder Cato is the most antient Latin author whose writings upon this interesting subject have reached our hands. His instructions are very judicious, but too concise. Varro added elegance of language to an improved Treatise of Agriculture; and, soon after him, Virgil published his justly admired Georgics; by far the most laboured and highly finished of all his works: these, indeed, he had most at heart; and upon these he chose to rest his future reputation. Columella afterwards collected, with great judgment, whatever was valuable in the writings of his predecessors, and enriched them with his own observations on the subject. His work is one of the choicest remains of antiquity, and has scarcely been equalled by any author since his time.

The irruptions of the barbarous nations of the north, unacquainted with the sweets of society, and the blessings of civil liberty, soon abolished improved agriculture. Arms were their only object. Their meanest slaves were intrusted with their trifling husbandry: and trifling it must have been during that unsettled state of nations. These innumerable and enterprising barbarians, who over-ran all Europe, were originally shepherds or hunters, like the present Tartars and the savages of America. They contented themselves with possessing, without labour or trouble, the vast deserts which their arms had made, and cultivated, very superficially, only a small spot near their habitations. The abject condition of those whom they employed for this purpose, unfortunately and unjustly caused the occupation itself, then to be looked upon as mean and ignoble. But when governments began to be founded upon more fixed and rational plans, agriculture, with the other arts, reared its head, and throve in proportion, as property became secure. A common wealth gave the first rise to the salutary change: for Venice may boast, that her Camillo Tarello was the first good author on this important subject, after the revival of useful knowledge.

The improvements made in England, in the reign of queen Elizabeth, shew, that the protestants, who were obliged to take shelter in the then free states, and particularly in Switzerland, had, with their love of liberty, learned an improved agriculture. In the next age, Hartlib is not less famed for his knowledge in farming, than for his friendship with Milton. The return of the men of genius, who had fled their country during Cromwell's usurpation, and the protection granted them after the restoration, added greatly to the progress of agriculture. At this period, from which England may date her grandeur, wealth, and power, writers of great character undertook the truly patriotic art. Such were Platt, Worlidge, Evelyn, &c. whose works did honour to the age, and proved highly beneficial to their country. The same laudable spirit appeared in an elegant system, published about this time by the ingenious and learned counsellor Conrad Herresbach,

in Germany; where a special attention to agriculture had begun to be the great object of several states, when a total stop was unhappily put to every thing of this kind, by the late war.

In France, two eminent physicians thought this subject worthy of their pens, and gave their country the *Maisons Rustiques*, a work which, afterwards perfected by a third physician, has undergone twenty-two editions. Nor does that country now by any means lose sight of this important subject. Real philosophers there make it their study, and pursue a series of well-made experiments, with such indefatigable care and accuracy, as cannot fail of producing very great advantages; whilst their monarch wisely protects and patronizes their undertakings. In the same manner the emperor of China, throughout his wide dominions, rewards the husbandman, who makes the best and greatest improvements in his land, with the dignity of a mandarin of the eighth class. The names of several illustrious improvers in France, deservedly distinguished for their patriotic application to this study, will appear in many articles of this work. A society in Britany, in particular, have begun upon a most judicious plan, which promises such success as must prove extremely beneficial to their country.

In Switzerland, a society established at Berne has already favoured the world with such specimens of the great judgment of its illustrious members, as leave no room to doubt but that their distinguished care and assiduity will be a lasting source of advantages to all mankind.

In Sweden, a genius has risen, who will ever deserve the highest commendation in the history of agriculture; though this is but a secondary part in his character. Linnæus has roused a spirit of enquiry into, and love of, natural knowledge, which will undoubtedly be attended with conspicuous emoluments to his native land.

In Denmark, a king, who, like our most august sovereign, makes the happiness of his people the chief object of his care, is so attentive to agriculture, that those gentlemen who travel at his expence, in order to learn, and introduce into his kingdom, every useful art, are directed to be peculiarly attentive to the art of husbandry.

The general spirit of improvement in agriculture, so remarkably exerted in the different nations of Europe, calls upon us not to lose that superiority which the happiness of our constitution and climate have given us.

The society of improvers in the knowledge of agriculture in Scotland, will ever deserve sincere thanks for many proofs of that truly laudable spirit which consults the general good of mankind: its worthy members set the noble example, and were first followed by the Dublin society; next by another society at Edinburgh; and now by one in London, in the more extensive manner of adding premiums to the instruction which the former only gave.

The society in Dublin have distinguished themselves so remarkably by their sound and unbiassed judgment and assiduity, in promoting the real interest of their country, that the parliament of that kingdom are now become their patrons, and have, with a truly public spirit, ordered large sums for carrying into execution their useful designs. Their observations, replete with excellent instructions, want only to be continued and increased.

The London society for the encouragement of arts, manufactures, and commerce, is formed upon a plan so universally beneficent, and directed by gentlemen of such high rank, and great abilities, as, when we consider that they actually take every opportunity, which prudence and intelligence can suggest, to promote the lasting welfare of their fellow-citizens, scarcely leaves room for any farther wish, unless it be, that they would impart to the whole world some portion of their treasures of useful knowledge.

That the real strength of every country depends upon its population, is a well known truth; and a little acquaintance with the principles of sound policy will shew, that the only solid basis of a numerous population is agriculture.



agriculture. Without this, the subsistence of a nation is precarious. Uncertainty of subsistence hinders people from marrying, and even induces them to quit their native soil. Husbandmen, whose children are their riches, are, of all persons, the fittest and most inclined to propagate their species. Trade, though a great, is but a secondary, source of wealth, and will, if carried too far, destroy the parent which gave it birth, by diminishing agriculture, depopulating the country, and annihilating, by degrees, that essentially necessary class of men who cultivate the earth. Indolence and avidity will tempt to quit a laborious occupation, for one that is attended with less toil and more lucre; though it be at the same time very precarious. The ease with which the artificers of luxury live, seduces the indigent peasant, draws him to towns and cities, and the country is deserted. But if agriculture be properly countenanced, encouraged, and put in so flourishing a state as to afford a comfortable subsistence to the very great numbers that may be employed in it, the husbandman will not forsake the solid occupation of his forefathers, to which he has been trained up; commerce will not exceed the bounds within which it ought to keep; luxury, that bane bane of mankind, will be effectually checked; and a martial spirit will animate every freeborn youth:—for the courage of the lower class of unemployed people is but a kind of mechanical instinct, allied at most with a certain love for their country, blended with the love of their own possessions. It is the robust labourer, hardened by fatigue, and by being exposed to all sorts of weather, who has the greatest inward feeling of his own strength: it is the husbandman who is most firmly attached to his country, by the portion of land which maintains him. The artist, who settles wherever he finds employment, cannot, strictly speaking, be said to have any country; though an useful member of the community, his retired sedentary life weakens his body, and depresses the spring of that spirit of liberty, which elevates the soul as much as the servile courses of luxury debase it:—of that spirit which so nobly distinguished our illustrious forefathers, and which we have so lately, with pleasure, seen revived in our present countrymen. Such was the spirit of the real Romans, of these conquerors of the world, whose only professions were arms and agriculture, and who made equal improvements in both: nor, indeed, can any two in the whole circle of human employments be more fitly joined: for the sturdy labouring youth, bred up to sobriety and rural toil, makes the hardiest soldier; and he who knows the fatigues and dangers of war, cheerfully returns to the culture of his farm. These were the men most prized by those masters of the universe: and, at this very day, the Arabians, who live under tents in the country, and remove occasionally from place to place, despise the rest of their nation who live in towns, look upon them as dastardly and effeminate; and, after repeated defeats, now keep them in subjection.

Those who imagine that a country life is repugnant to politeness, are surely much mistaken. True politeness, the most cordial affection, the sincerest friendship, and unfeigned courtesy, without the grimace of strained compliments, have often been found among the labouring rural race, inhabitants of thatched cottages. The appellations of rude and rustic were never given to really useful occupations, till luxury had debauched mankind, and a frivolous pertness usurped the place of sense and manners. Till then, men naturally esteemed an art, of which every day's experience shewed them the absolute necessity, as well as the great advantages. If the generality of country gentlemen are reproached with rusticity of manners, it is their passion for sporting, as they call it, and not their application to agriculture, which gives them that behaviour. There would be no room for this imputation, if they were oftener in the field with their workmen, than upon the turf, or in the thickets with their horses and dogs.

But whilst we are displaying a small part only of the praise justly due to agriculture, let it not be imagined that, in our opinion, every man should be a farmer. This is so far from being necessary, that would inevitably bring us back to barbarism. It is sufficient that

those who are destined to it, be instructed and protected; and it will always be right in the legislature to consider and examine the due degree of estimation in which this art should be held, the just hopes that may reasonably be entertained of its further progress, and the means by which it may best be carried to the greatest perfection.

By proper application to this essential art, the philosopher, from whom we must expect the greatest improvements, will have a pleasing opportunity of gratifying his desire, by enlarging his knowledge of nature: the individual, who puts in practice the discoveries of the philosopher, will find the surest way of increasing his fortune; and the sovereign, who directs and favours the labours of all, will establish his power, independent of all others, upon a foundation which cannot be shaken.

AGRIMONIA, AGRIMONY, in botany, a genus of the dodecandria digynia class. There are three species of this genus, viz. the eupatoria, repens, and agrimonoides; of which the eupatoria only is a native of Britain. The calix of the eupatoria is quinque-dentate; it has five petals, and two seeds in the bottom of the calix. It is said to be good in obstructions of the liver, &c.

AGRIPPA, in midwifery, a term applied to children brought forth with their feet foremost. See MIDWIFERY.

AGROSTOGRAPHY, the history, or description of grasses. We have a treatise written by Scheuchzer, under this title, containing accurate descriptions of several hundred species of grasses.

AGRYPNIA, a term with physicians for watching, or an inaptitude to sleep.

AGUE, a general name for all periodical fevers, which, according to the different times of the return of the feverish paroxysm, or fit, are denominated quotidian, tertian, or quartan agues. See the article QUOTIDIAN, &c.

Agues are thought to be owing to a suppression of perspiration, as their more immediate cause, whether that be occasioned by a foggy and moist air, or by putrid damps; but their *causa proxima* seems to be an actual corruption of the humours of the body.

Dr. Pringle thinks the best way of accounting for the periodical returns, is upon the principle of putrefaction. The heat of the body, he observes, varies little, and therefore the corruption produced in any of the humours must happen in a determinate time. If we suppose, that in the paroxysm the more corrupted particles of the blood do not all pass off through the skin with the sweat, but that some part of them are discharged with the bile; these particles coming into the intestines, and being from thence taken up by the lacteals, and carried into the blood, may there act as a new ferment, and occasion a return of the fit. Thus, the corruption of the bile may be the effect of the first fit, and the cause of those that ensue.

The doctor further observes, that though all moist countries are subject to agues of some kind or other; yet if the moisture is pure, and the summers are not close and hot, they will mostly appear in a regular tertian shape, and be easily cured. But if the moisture arises from long stagnating water, in which plants, fishes and insects die and rot, then the damps, being of a putrid nature, not only occasion more frequent, but more dangerous fevers, which oftener appear in the form of quotidians, and double tertians, than that of single ones.

It is remarkable, how much these fevers vary with the season; for however frequent, violent, or dangerous they are in the decline of summer, or beginning of autumn, when the putrefaction is highest; yet before winter they are commonly reduced to a small number, become mild, and generally assume a regular tertian form.

AGUE-TREE, a name by which some call *sassafras*, on account of its febrifuge qualities.

A-HEAD, in maritime affairs, implies some object directly before the ship.

AHICCYATILI, an American serpent, nearly resembling the rattle-snake. The former is, however, smaller than the latter, and wants the rattle in its tail:



but its poison is at least as deleterious as any yet known.

AID, in a general sense, denotes any kind of assistance given by one person to another.

AID, or AYDE, in law, implies a petition made in court to call in help from another person, who has interest in land, or other thing contested. This is called *aid prier*, which not only strengthens the party that prays for the aid, but gives the other person an opportunity of avoiding a prejudice that might otherwise accrue to his own right. Thus, a tenant for life may pray aid of the person in reversion; and a city or borough, that holds a fee-farm of the king, if any thing be demanded of them, may pray for aid of the king.

AID-DE-CAMP, in military affairs, signifies an officer employed to receive and carry the orders of a general.

AID-MAJOR, the same with adjutant. See ADJUTANT.

AID, *Auxilium*, in our ancient customs, implies a subsidy paid by vassals to their lord, on certain occasions.

Such were the aid of relief, paid upon the death of the lord mesne, to his heir; the *aid cheval*, or capital aid, due to the chief lord on several occasions; as to make his eldest son a knight, to make up a portion for marrying his daughter; and so in other cases.

Royal AID, an appellation sometimes given to the land-tax.

AIDS, in the manege, are the same with what some writers call cherishings, and used to avoid the necessity of corrections.

AIPIMIXIRA, in zoology, the american name of a fish, more generally known by that of pudiano.

AIR, *aër*, in physiology, a thin elastic fluid, surrounding the globe of the earth. It is no easy task to ascertain the nature and origin of air, as being a fluid imperceptible to all our senses, except that of feeling. Indeed, from the resistance and impression it makes, we know that there is such a body, which every where surrounds our earth, and is of the utmost importance not only to mankind, in promoting many useful arts, but absolutely necessary to the preservation of animal life itself.

The best account we have of the origin of air, is that of Mr. Boyle, who supposes it to be made up of three different kinds of corpuscles, viz. 1. Of those numberless and minute particles, which, in the form of vapours or dry exhalations, ascend from the earth, water, minerals, vegetables, animals, &c. in short, of whatever substances are elevated by the celestial or subterraneous heat, and thence diffused into the atmosphere. 2. Of a still more subtle matter, consisting of those exceedingly minute atoms, the magnetical effluvia of the earth, with other innumerable particles sent from the bodies of the celestial luminaries, and causing, by their impulse, the idea of light in us. 3. Of an elastic substance, which is the basis of all the other parts, and constitutes the true essence of air, concerning the structure of which various hypotheses have been framed. Some have resembled these elastic particles to the springs of watches coiled up, and endeavouring to restore themselves; others to flocks of wool, which being compressed, have an elastic force; and others to slender wires, of different substances, consistences, &c. yet all springy, expansible, and compressible.

Among the artificial methods of producing air, the fittest for practice seem to be fermentation, corrosion, and the dissolution of bodies, by the boiling of water, and other liquors; by the mutual actions of bodies one upon another, especially saline ones; and lastly by analysing and resolving certain substances.

It appears from the experiments made by the learned Dr. Hales, that different bodies contain different quantities of air, from a sixteenth to one half of their whole substance. In the following table, the first column shews the bulk of the body in cubic inches; the second, its weight in grains; the third, the quantity of generated air in cubic inches; the fourth, the weight of this air in grains; and the fifth shews the proportion which it bears to the whole.

Substances.		C. Inches.	Grains.	C. Inches.	Grains.	Proper.
Deer's horn	-	$\frac{1}{2}$	241	117	33	$\frac{1}{17}$
Oyster-shell	-	$\frac{1}{2}$	266	162	46	$\frac{1}{10}$
Heart of oak	-	$\frac{1}{2}$	135	108	30	$\frac{1}{11}$
Indian wheat	-	-	388	270	77	$\frac{1}{5}$
Pease	-	1	318	396	113	$\frac{1}{3}$
Mustard-seed	-	-	437	270	77	$\frac{1}{5}$
Amber	-	$\frac{1}{2}$	135	135	38	$\frac{1}{3}$
Dry tobacco	-	-	142	153	44	$\frac{1}{4}$
Honey, with calx of bones	-	1	359	144	41	$\frac{1}{9}$
Yellow wax	-	1	243	54	15	$\frac{1}{16}$
Coarse sugar	-	1	373	126	36	$\frac{1}{10}$
Newcastle coal	-	$\frac{1}{2}$	158	180	51	$\frac{1}{3}$
Nitre, with calx of bones	-	$\frac{1}{2}$	211	90	26	$\frac{1}{8}$
Rhenish tartar	-	1	443	504	144	$\frac{1}{3}$
Calculus humanus	-	$\frac{1}{4}$	230	516	147	$\frac{1}{2}$

*Properties of AIR.* Air being an universal and powerful instrument, which nature is constantly applying in all her works, the knowledge of its active properties is highly necessary not only to the chymist and physician, but to the philosopher and divine.

1. Fluidity, then, which is one of the most obvious and essential properties of air, seems to be owing to the tenuity of its parts. That air is a fluid, appears from the easy passage it affords to all bodies moving in it. However, air differs from all other fluids, in being compressible, in its differing in density according to its height from the earth's surface, and in being incapable of fixation, at least by itself. See ATMOSPHERE.

2. Gravity, another considerable property of air, may be proved from various experiments, among which one is very exact, viz. by weighing it in a balance like other heavy bodies. Having exhausted all the air, as near as can be, out of a glass flask, whose capacity is exactly known in cubic inches, hang it to the end of a nice hydrostatical balance, placing grain weights in the opposite scale, to counterbalance it. When the equilibrium is nicely obtained, lift up the valve of the flask, and the air will be heard to rush in; on which the flask will preponderate greatly. To restore the equilibrium again, it is necessary to add about eight grains for every pint the flask contains; which shews that a gallon of air weighs about a dram, and a bushel an ounce troy.

However, as the air is an heterogeneous fluid, its weight must vary according to its different component parts; hence an instrument called a barometer, has been invented to shew this variation. See the article BAROMETER.

3. Elasticity, a third essential property of air, is evident from the common experiment of a blown bladder. The elasticity of air, or the force whereby it endeavours to expand itself, is always as its density. Hence, if air, near the surface of earth, be included in any vessel, without altering its density, the pressure of the included air will be equal to the weight of the atmosphere. Hence too it is evident, that the more air is compressed, the greater will be its spring.

Mr. Boyle has determined the difference between the most rarified and most condensed air, to be as 1 to 520000: since therefore, after so high a degree of rarefaction and condensation, its elasticity still remains, we may fairly conclude air to be an unchangeably elastic, moveable fluid, constantly operating in, and upon all bodies, by its own peculiar vibratory motion.

Heat is found to increase the elasticity of air, and cold to have a quite contrary effect: hence appears the use of the thermometer for indicating the various degrees of both. See THERMOMETER.

To the pressure of air, we are to attribute the coherence of the parts of bodies. Breathing too, on which depends animal life, is owing to the pressure and spring of the air; and to the same cause may be attributed the production of fire and flame, as appears from the sudden extinction of a coal or candle in the exhausted receiver. It is likewise necessary for the existence



ence and propagation of sounds, for the germination and growth of plants, for conveying all the variety of smells, and for transmitting the rays and influence of the celestial bodies. In short, such is the generating and vivifying power of air, that some of the ancient philosophers considered it as the first principle of all things.

Air not only acts upon all bodies, by its common properties of weight and elasticity, but by the peculiar virtues of the ingredients whereof it is composed. By means of a corroding acid it dissolves iron and copper, unless well defended by oil. Even gold, in the chymists laboratory, when the air is impregnated with the effluvia of aqua regia, contracts a rust like other bodies. It fixes volatile bodies, and volatilizes those which are fixed.

From the different effluvia, diffused through the air, proceed a variety of effects. Near mines of copper, it will discolour silver and brass; and in London, the air of which abounds with acid and corrosive particles, metalline utensils rust sooner than in the country. It is very difficult to obtain oil of sulphur in a clear dry air, as its parts are then more ready to evaporate; whereas, in a moist cloudy air, it may be obtained in abundance. All salts melt most readily in cloudy weather; and separations succeed best in the same state of the air. If pure wine be carried into a place where the air is full of the fumes of wine then fermenting, it will begin to ferment afresh.

AIR, in medicine, makes one of the six non-naturals, and that not the least powerful. The very life of animals depends on it, as is proved by experiments in the air-pump; most animals being unable to live in the exhausted receiver.

The wholesomeness or unwholesomeness of air, is certainly owing to the different effluvia with which it abounds. Lord Bacon thinks the best air is to be met with in open champaign countries; where the soil is dry, not parched or sandy, and spontaneously produces wild thyme, wild marjoram, and the like sweet-scented plants. That near rivers he thinks rather prejudicial, unless they are small, clear, and have a gravelly channel. The morning air is deemed more refreshing than that of the evening, and air agitated with breezes, than that which is serene and still.

As good air contributes greatly to health, so that which is bad is no less prejudicial to it. Stagnating air is productive of putrid and malignant disorders, as dysenteries, bilious fevers, &c. and that which is too moist, of inflammatory ones, as coughs, rheumatisms, &c. Moist and rainy seasons, however, differ widely in this respect; since in marshy countries, intense and continued heats occasion the greatest moisture in the air: whereas frequent showers, during the hot season, cool it, and check the excess of vapour, dilute and refresh the corrupted stagnating water, and precipitate all noxious and putrid effluvia.

AIR, in mythology, was adored by the heathens under the names of Jupiter and Juno; the former representing the superior and finer part of the atmosphere, and the latter the inferior and grosser part. The augurs also drew presages from the clouds, thunder, lightening, &c.

AIR, in painting, &c. denotes the manner and very life of action; or it is that which expresses the disposition of the agent.

It is sometimes also used in a somewhat synonymous sense with gesture or attitude.

AIR, in musick, denotes the melody proper for songs, odes, and the like; being usually quick and lively.

Sometimes it is used for the songs themselves, called by the Romans *æra*, from which the modern term air is derived.

It is an observation of Lord Bacon, that airs have some affinity with the affections of the mind: thus, there are merry airs, doleful airs, warlike airs, airs inclining to pity, &c. And hence we are to account for the great influence of musick. But the same author remarks, that though this variety of airs disposes the mind to a variety of passions conformable to them;

yet, generally speaking, musick feeds that disposition of the spirits which it finds.

AIRS, in the manege, are the artificial motions of taught horses, as the demivolt; curvet, capriole, &c.

An air is defined to be a cadence and liberty of motion, accommodated to the natural disposition of the horse; making him rise with obedience, measure, and justness of time.

Some even extend the meaning of the word to the natural paces of the horse, as walking, trotting, galloping; but the more exact writers restrain it to those motions already mentioned.

AIR-BLADDER, the same with what some call the *swim*, or *swimming-bladder*; being a vesicle found in the bodies of all fishes; the cartilaginous, cataceous, and perhaps a few other kinds excepted.

By this bladder, which is always more or less replete with air, the fish is enabled to sustain its body at any depth. Near the bottom, the great weight of the incumbent water compresses the body of the fish, or rather the inclosed air-bladder, till it becomes equiponderant with an equal bulk of water. In the middle region, where the pressure is less, the air-bladder expands; and thereby increases the bulk of the fish, without adding any thing to its weight, till it becomes equiponderant with an equal bulk of water. As the fish continues to rise, the air-bladder still expands and sustains it.

It is highly probable, that fishes have a power of expanding or compressing the air-bladder, exclusive of the weight of the water, and by that means of rising, or sinking, according as they dilate or compress the bladder.

Some fishes have only a single air-bladder; others, a double one; and in others, it is triple, or divided into three cells. Fishes which lie grovelling at the bottom, have no air-bladders; and it is remarkable, that if the air-bladder be pricked or burst, in fishes naturally furnished with it, they immediately sink to the bottom, from whence they can never raise themselves.

AIR-GUN, a pneumatic machine for exploding bullets, &c. with great violence.

The common air-gun is made of brass, and has two barrels; the inside barrel A (*plate I. fig. 9.*) is of a small bore, from whence the bullets are exploded; and a large barrel EC DR on the outside of it. There is a syringe SMNP fixed in the stock of the gun, by which the air is injected into the cavity between the two barrels through the valve EP. The ball is put down into its place in the small barrel with the rammer, as in another gun. At SL is another valve, which being opened by the trigger O, permits the air to come behind the bullet so as to drive it out with great force.—If this valve be opened and shut suddenly, one charge of condensed air may be sufficient for several discharges of bullets; but if the whole air be discharged on one single bullet, it will drive it out with a great force. This discharge is effected by means of a lock k, (*fig. 10.*) placed here, as is usual in other guns; for the trigger being pulled, the cock k will go down and drive the lever O (*fig. 9.*) which will open the valve, and let in the air upon the bullet.

In the air-gun, and all other cases where the air is required to be condensed to a very great degree, it will be requisite to have the syringe of a small bore, viz. not exceeding half an inch in diameter; because the pressure against every square inch is about 15 pounds, and therefore against every circular inch about 12 pounds. If therefore the syringe be one inch in diameter, when one atmosphere is injected, there will be a resistance of 12 pounds against the piston; and when ten are injected, there will be a force of 120 pounds to be overcome; whereas ten atmospheres act against the circular half-inch piston (whose area is only one fourth part so big) with only a force equal to thirty pounds; or 40 atmospheres may be injected with such a syringe as well as 10 with the other. In short, the facility of working will be inversely, as the squares of the diameter of the syringe.

AIR-PUMP, a pneumatic machine, by which the air



air contained in a proper vessel, called a receiver, may be exhausted.

The celebrated Otto de Guericke, a burgomaster of Magdeburg, who performed several experiments on it at Ratisbon, before the emperor and several other persons of distinction, in the year 1654, was the inventor of this noble instrument. But it was very defective, requiring the labour of two strong men, for above two hours, to exhaust the air out of two glass-vessels, plunged under water. Some time after, Mr. Boyle, with the assistance of Dr. Hook, contrived a new air-pump, more commodious and better adapted to experiments than that of the German author, and hence the instrument was called *Machina Boyleana*. Several sorts of air-pumps have been from time to time constructed, and several improvements made in this useful machine at different times and by different persons.

What is generally in use, was published by Mr. Hawksbee, in the year 1709: but as the ingenious Mr. Smeaton has greatly improved this useful machine, and shewn the imperfections which attended all former air-pumps, we shall here give a description of his machine, in his own words.

“The principal causes of imperfection in the common pumps arise, first, from the difficulty in opening the valves at the bottom of the barrels; and, secondly, from the piston’s not fitting exactly, when put close down to the bottom, which leaves a lodgment for air, that is not got out of the barrel, and proves of bad effect.

“In regard to the first of these causes, the valves of air-pumps are commonly made of a bit of thin bladder, stretched over a hole generally much less than one tenth of an inch diameter; and to prevent the air from repassing between the bladder and the plate, upon which it is spread, the valve must always be kept moist with oil or water.

“It is well known, that at each stroke of the pump the air is more and more rarified, in a certain progression, which would be such, that an equal proportion of the remainder would be taken away, was it not affected by the impediments I have mentioned: so that, when the spring of the air in the receiver becomes so weak, as not to be able to overcome the cohesion of the bladder to the plate, occasioned by the fluid between them, the weight of the bladder, and the resistance that it makes by being stretched, the rarification cannot be carried further, though the pump should still continue to be worked.

“It is evident, the larger the hole is, over which the bladder is laid, a proportionably greater force is exerted upon it by the included air, in order to lift it up; but the aperture of the hole cannot be made very large, because the pressure of the incumbent air would either burst the valve, or so far force it down into the cavity, as to prevent its lying flat and close upon the plate, which is absolutely necessary.

“To avoid these inconveniencies as much as possible, instead of one hole, I have made use of seven, all of equal size and shape; one being in the centre, and the other six round it: so that the valve is supported at proper distances by a kind of grating, made by the solid parts between these holes: and, to render the points of contact, between the bladder and grating, as few as possible, the holes are made hexagonal, and the partitions filed almost to an edge. As the whole pressure of the atmosphere can never be exerted but upon this valve, in the construction made use of in this pump; and, as the bladder is fastened in four places instead of two, I have made the breadth of the hexagons three tenths of an inch; so that the surface of each of them is more than nine times greater than common. But as the circumference of each hole is more than three times greater than common, and as the force that holds down the valve, arising from cohesion, is, in the first moment of the air’s exerting its force, proportionable to the circumference of the hole, the valve over any of these holes will be raised with three times more ease than common: but as the raising the valve over the centre-hole is assisted on all sides by those placed round it, and as they altogether contribute as much to raise

the bladder over the centre-hole, as the air immediately acting under it; upon this account the valve will be raised with double the ease that we have before supposed, or with a sixth part of the force commonly necessary.

“It is not material to consider the force of the cohesion, after the first instant: for, after the bladder begins to rise, it exposes a greater surface to the air underneath, which makes it move more easily. I have not brought into this account, the force that keeps down the valve, that arises from the weight of the bladder, and the resistance from its being stretched; for I look upon these as small in comparison of the other.

“I was not, however, contented with this construction of the valves, till I had tried what effect would be produced, when they were opened by the motion of the winch, independent of the spring of the air: and though the contrivance I made use of seemed to me less liable to objection than any thing I was acquainted with, that had been designed for that purpose; yet I did not find it to answer the end better than what I have already described; and therefore laid it aside, as it rendered the machinery much more complex, and troublesome to execute.

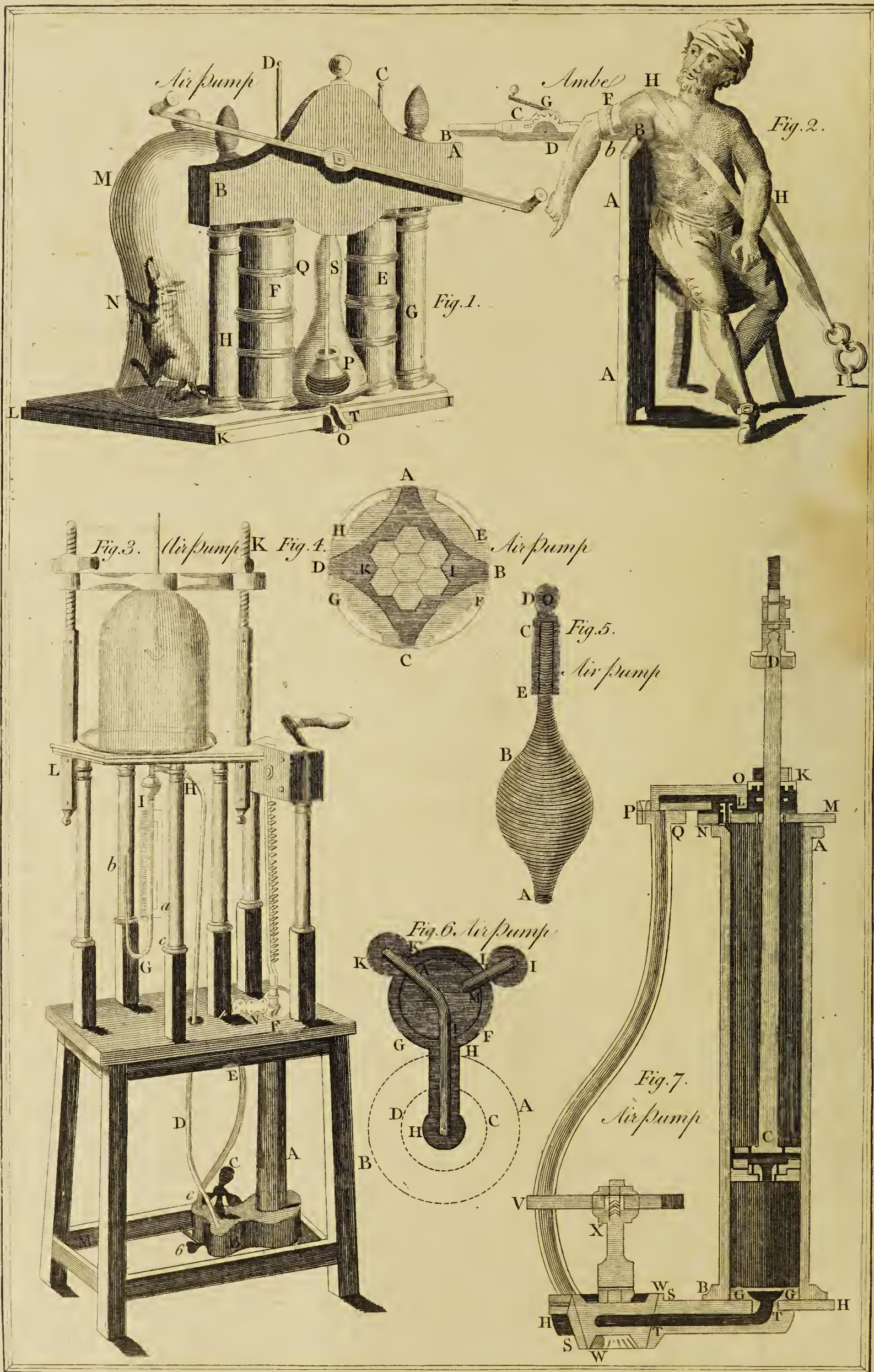
“But, supposing all those difficulties to be absolutely overcome, the other defect, that I mentioned in the common construction, would hinder the rarification from being carried on beyond a certain degree. For, as the piston cannot be made to fit so close to the bottom of the barrel, as totally to exclude all the air, as the piston rises, this air will expand itself: but still pressing upon the valve, according to its density, hinders the air within the receiver from coming out: hence, were this vacancy to equal the 150th part of the capacity of the whole barrel, no air could ever pass out of the receiver, when expanded 150 times, though the piston was constantly drawn to the top; because the air in the receiver would be in equilibrio with that in the barrel, when in its most expanded state. This I have endeavoured to overcome, by shutting up the top of the barrel with a plate, having in the middle a collar of leathers, through which the cylindrical rod works that carries the piston. By this means the external air is prevented from pressing upon the piston; but that the air that passes through the valve of the piston from below may be discharged out of the barrel, there is also a valve applied to the plate at the top that opens upwards. The consequence of this construction is, that, when the piston is put down to the bottom of the cylinder, the air in the lodgment under the piston will evacuate itself so much the more, as the valve of the piston opens more easily, when pressed by the rarified air above it, than when pressed by the whole weight of the atmosphere. Hence, as the piston may be made to fit as nearly to the top of the cylinder, as it can to the bottom, the air may be rarified as much above the piston as it could before have been in the receiver. It follows, therefore, that the air may now be rarified in the receiver, in duplicate proportion of what it could be upon the common principle; every thing else being supposed perfect. Another advantage of this construction is, that though the pump is composed of a single barrel, yet the pressure of the outward air being taken off by the upper plate, the piston is worked with more ease than the common pumps with two barrels; and not only so, but when a considerable degree of rarification is desired, it will do quicker; for the terms of the series expressing the quantity of air taken away at each stroke, do not diminish so fast as the series answering the common one.

“I have found the gauges that have been hitherto made use of for measuring the expansion of the air, very unfit to determine in an experiment of so much nicety. I have therefore contrived one of a different sort, which measures the expansion with certainty, to much less than the 1000th part of the whole. It consists of a bulb of glass something in the shape of a pear, and sufficient to hold about half a pound of quicksilver. It is open at one end, and at the other is a tube hermetically closed at top. By the help of a nice pair of scales, I found what proportion of weight a column











lumn of mercury, of a certain length, contained in the tube, bore to that which filled the whole vessel. By these means I was enabled to mark divisions upon the tube, answering to the 1000th part of the whole capacity, which, being of about one tenth of an inch each, may, by estimation, be easily subdivided into smaller parts. This gauge, during the exhausting of the receiver, is suspended therein by a slip wire. When the pump is worked as much as shall be thought necessary, the gauge is pushed down, till the open end is immersed in a cistern of quicksilver placed underneath: the air being then let in, the quicksilver will be driven into the gauge, till the air remaining in it becomes of the same density with the external; and as the air always takes the highest place, the tube being uppermost, the expansion will be determined by the number of divisions occupied by the air at the top. The degree, to which I have been able to rarefy the air in experiment, has generally been about 1000 times, when the pump is put clean together; but the moisture that adheres to the inside of the barrel, as well as other internal parts, upon letting in the air, is in the same succeeding trials worked together with the oil, which soon renders it so clammy as to obstruct the action of the pump upon a fluid so subtil as the air is, when so much expanded; but in this case it seldom fails to act upon the air in the receiver, till it is expanded 500 times: and this I have found it to do, after being frequently used for several months without cleaning. I have also generally found it to perform best the first trial at each time of using, though nothing had been at it from the time preceding; which, after a great many trials made with this view, I also attribute to the vapours of the air mixing with the oil. An experiment, where the air was expanded 1000 times, was tried about two years since in the presence of the Royal Society; at which were present also Dr. Knight and Mr. Canton, and I lately did the same thing with Mr. Watfon. The pump which I intended myself the honour of shewing the society, is the same that I just now mentioned; and the second that I made, with a view to improve upon this principle.

"The degree of rarefaction, produced by the best of the three pumps, that you procured the trial of, and which you esteemed good in their kind, and in complete order, never exceeded 140 times, when tried by the gauge before described.

"I have also endeavoured to render the pneumatic apparatus more simple and commodious, by making this air-pump act as a condensing engine at pleasure, by singly turning a cock. This not only enables us to try any experiments under different circumstances of pressure, without changing the apparatus, but renders the pump an universal engine, for shewing any effect that arises from an alteration in the density or spring of the air. Thus, with a little addition of apparatus, it shews the experiments of the air-fountain, wind-gun, &c.

"This is done in the following manner; the air above the piston, being forcibly driven out of the barrel at each stroke, and having no where to escape, but by the valve at the top; if this valve be connected with the receiver, by means of a pipe, and at the same time the valve at the bottom, instead of communicating with the receiver, be made to communicate with the external air, the pump will then perform as a condenser.

"The mechanism is thus ordered: there is a cock with three pipes placed round it, at equal distances; the key is so pierced that any two may be made to communicate, while the other is left open to the external air. One of these pipes goes to the valve at the bottom of the barrel; another goes to the valve at the top, and a third goes to the receiver. Thus, when the pipe from the receiver, and that from the bottom of the barrel, are united, the pump exhausts; but turn the cock round, till the pipe from the receiver, and that from the top of the barrel, communicate, and it then condenses. The third pipe, in one case, discharges the air taken from the receiver into the barrel; and, in the other lets it into the barrel, that it may be forced into the receiver.

"Plate III. fig. 3. is a perspective view of the principal parts of the pump together. A is the barrel. B

the cistern, in which are included the cock, with several joints. These are covered with water to keep them air-tight. A little cock to let the water out of the cistern, is marked 6. Cc is the triangular handle of the key of the cock; which, by the marks on its arms, shews how it must be turned, that the pump may produce the effect desired. DH is the pipe of communication between the cock and the receiver. E is the pipe that communicates between the cock and the valve, on the upper plate of the barrel. F is the upper plate of the pump, which contains the collar of leathers d, and V the valve which is covered by the piece f. GI is the siphon gauge, which screws on and off, and is adapted to common purposes. It consists of a glass tube hermetically sealed, and furnished with quicksilver in each leg; which, before the pump begins to work, lies level in the line ab; the space bc being filled with air of the common density. When the pump exhausts, the air in bc expands, and the quicksilver in the opposite leg rises, till it becomes a counter-balance to it. Its use is shewn upon the scale Ia, by which the expansion of the air in the receiver may be nearly judged of. When the pump condenses, the quicksilver rises in the other leg; and the degree may be nearly judged of by the contraction of the air in bc; marks being placed at  $\frac{1}{2}$  and  $\frac{1}{3}$  of the length of bc from c, which shews when the receiver contains double or treble its common quantity. KL is a screw-frame to hold down the receiver, in condensing experiments, which takes off at pleasure; and is sufficient to hold down a receiver, the diameter of whose base is seven inches, when charged with a treble atmosphere; in which case it acts with a force of about 800 pounds against the screw-frame. M is a screw, that fastens a bolt, which slides up and down in that leg, by means whereof the machine is made to stand fast on uneven ground.

"Fig. 7. is a perpendicular section of the barrel and cock, &c. when AB represents the barrel. CD the rod of the piston, which passes through MN the plate, which closes the top of the barrel. K is the collar of leathers, through which the piston rod passes. When the piston is at the bottom of the cylinder, the upper part of K is covered by the cap at D, to keep out dust, &c. L is the valve on the upper plate, which is covered by the piece O, P, which is connected with the pipe Q, R, which makes the communication between the valve and the cock. C, E, is the piston; and, E, F, F, is the piston valve. I, I, are two little holes to let the air pass from the piston valve into the upper part of the barrel. G, G, K, is the principal valve at the bottom of the cylinder. H, H, is a piece of metal, into which the valve G, G, K, is screwed, and closes the bottom of the cylinder; out of which also is composed S, S, the cock, and K, T, T, the ducts from the cock to the bottom of the barrel. W, W, is the key of the cock. X, the stem; and V, V, the handle.

"Fig. 6. is an horizontal section of the cock, through the middle of the duct T, T. A, B, represents the bigness of the circular plate that closes the bottom of the barrel. C, D, represents the bigness of the inside of the barrel. E, F, G, is the body of the cock; the outward shell being pierced with three holes at equal distances, and corresponding to the three ducts, HH, II, KK, whereof HH, is the duct that goes to the bottom of the barrel. II is the duct that communicates with the top of the barrel; and KK is the duct that passes from the cock to the receiver. L, M, N, is the key, or solid part of the cock, moveable round in the shell EF G. When the canal LM answers to the ducts HH and KK, the pump exhausts, and the air is discharged by the perforation N. But, the key L, M, N, being turned till the canal LM answers to II and KK, the perforation N will then answer to HH; and, in this case, the pump condenses. Lastly, when N answers to KK, the air is then let in or discharged from the receiver; as the circumstance requires.

"Fig. 4. is the plan of the principal valve. A, B, C, D, represents the bladder fastened in four places, and stretched over the seven holes I, K, formed into an hexagonal grating, which I shall call the honeycomb. E, F, G, H, shews where the metal is a little



protuberant, to hinder the piston from striking against the bladder.

"Fig. 5 represents the new gauge, which I call the pear gauge. It is open at A; B, C, is the graduated tube, which is hermetically closed at C, as is suspended by the piece of brass D, E, that is hollowed into a cylinder, and clasps the tube."

*Portable AIR-PUMP*, the common air-pump greatly reduced in its dimensions, and the working part of the machine, placed in a different position to the former.

This pump is represented on (plate III. fig. 1.) where A, B, is the head, or part containing the wheel, which alternately rises and depresses the pistons C, D, in the barrels E, F, which are strongly pressed down by the said part A, B, supported by the two pillars G, H, fixed into the bed or bottom I, K, L, of the machine. On this bottom stands the receiver M, N, on a large, smooth, brass plate, in the middle of which is a hole, by which the air passes out of the receiver into a small tube on the under part of the frame, and goes to the piece O, which communicates with the perforated brass piece on which the barrels stand, and from which they receive the air to be exhausted: on the middle part of this brass piece is a perforation, over which is placed a small receiver P, Q, and under it a basin of mercury R, in which a small tube R, S, hermetically sealed at one end, and filled with quicksilver, is inverted; and consequently, as the small receiver P, Q, is exhausted, together with the large one M, N, the approach of the vacuum will be indicated by the descent of the quicksilver in the tube R, S. By means of a stop-cock at T, the air is again let into the receiver.

*Theory of the AIR-PUMP.* M. Varignon, in the *Memoires de Mathematique & de Physique*, for December 1693, gives a general theorem for finding the ratio of the density of the air in its natural state to that in the receiver, after a certain number of strokes of the piston in the barrel; which, if we put  $a$  = state of the natural air,  $x$  = the state after any number of strokes,  $c$  = the capacity of the receiver,  $b$  = the capacity of the receiver and barrel together; and  $d$  = the number of strokes, we shall have this proportion,  $a :: \frac{d}{b} : \frac{d}{c}$ . The truth of which is evident, if we con-

sider that each time the piston is thrust down to the bottom of the barrel and raised up again, the air by its elastic spring will expand itself, and fill up the cavity made by the piston; therefore, after each stroke of the piston in the barrel, the remaining air in the receiver and barrel will be to that in the receiver before, as the capacity of the receiver alone, to the capacity of the receiver and barrel together.

Suppose  $e, f, g, h$ , to be the logarithms of  $a, x, b, c$ . Then as  $e : f :: gd : bd :: e + bd = f + gd$ , or  $e - f = gd - bd$ ; where  $gd - bd$  is the logarithm of the ratio of the air sought. In words, the logarithm of the ratio of the density of the air in its natural state to that in the receiver after the operation, is always equal to the product of the number of strokes of the piston, multiplied by the logarithm of the ratio, between the capacity of the barrel and receiver together, and the receiver alone.

Thus if the capacity of the receiver be 10, that of the barrel 1, and the number of strokes 30; then will the primitive air be found to the remaining, as 1 to  $\frac{1}{18}$  nearly.—If the capacity of the receiver and barrel were given, and it were required to find the number of strokes of the piston to rarefy the air to a certain degree; then, from the theorem above,  $e - f = gd - bd$ ,

we get  $\frac{e-f}{g-b} = d$  = the number of strokes required;

which is in words, subtract the logarithm of the remaining air from the logarithm of the primitive air; likewise the logarithm of the capacity of the receiver, from the logarithm of the sum of the capacity of the receiver and barrel together, and then dividing the first difference by the latter, the quotient will be the number of strokes required. Thus, suppose the content of the receiver be equal to 600 cubic inches, and the content of the barrel be equal to 30 cubic inches, what

number of strokes, or turns of the pump will rarefy the air under the receiver 800 times more than in its natural state? The answer will be, 137.007, which is the strokes and part of a turn, required to rarefy the air 800 times more than when in its natural state. If the content of the receiver be required, the other things being given, we shall find from the above theorem, the expression will be  $\frac{e-f}{d} + b = g$ .

*AIR-SHAFTS*, in mining, are holes continued from the open air to the audits, in order to supply the subterranean works with fresh air, and give vent to the damps and noxious vapours.

*AIR-THREADS*, in natural history, are the long filaments so frequently seen floating in the air, especially about the autumn season.

These threads are the work of spiders, especially of that species called the long-legged field-spider; which having mounted to the summit of a bush or tree, darts from its tail several of these threads, till one is produced capable of supporting the creature in the air; on this it mounts in quest of prey, and frequently rises to a very considerable height.

*AIR-VESSELS*, among botanists, are certain vessels, ducts, or tubes, observable in plants, for imbibing and conveying air to the different parts of the vegetable.

*AIRIANI*, in church history, a branch of arians, who, beside the common dogma of that sect, denied the consubstantiality of the Holy Ghost with the Father and the Son.

*AIRING*, in horsemanship, implies the exercising the horse in the open air.

*AIRY*, or *AERY*, among sportsmen, implies the nest of a hawk or eagle.

*AIRY Triplicity*, in astrology, the three signs Gemini, Libra, and Aquarius.

*AIUS LOCUTIUS*, a speaking voice, the name of a deity, to whom the Romans erected an altar.

*AJUTAGE*, or *ADJUTAGE*, in hydraulics, a kind of tube fitted to the mouth of a vessel, through which the water is played, or directed into any desired figure; so that the great variety of fountains is chiefly owing to the different structure of their ajutages.

M. Mariott, who was very conversant in the doctrine of adjutages, very justly observes, that there is a certain and just proportion to be observed between the adjutage, whereby the jet is delivered, and the pipe conducting it from the head. In general, about five times the diameter of the adjutage for jets under half an inch, and six or seven times for all above, will fit the pipes of conduct pretty well.

In reservoirs of the same altitude, and adjutages of different diameters, the expence of water is proportionable to the squares of the diameters of the adjutages. But in reservoirs of different altitudes, the excess of the expence of water from greater heights more than in smaller is in the subduplicate ratio, or as the square roots of the altitudes. The expence of water of two reservoirs, whose heights are different and also their adjutages, are in the compound ratio of the squares of the diameters of the adjutages, and of the subduplicate ratio of the heights.

It is shewn from experiment, that 14 Paris pints of water will be delivered in a minute from an adjutage of three lines diameter, when the height of the reservoir above the orifice is 12 feet; which may be taken as a fundamental rule for fountains assisted with these principles.

Water spouting upwards, through an adjutage, would ascend to the same height as that of its upper surface in the reservoir, were it not for the resistance of the air, the friction at the sides of the adjutage, and some little impediments of the motion of the water in itself; on account of all which, this height of the rise is always defective.

It is found, by experience, that if the direction of the adjutage be a small matter inclined, the water will rise higher than if it be truly upright; and that a polished round hole, in a thin plate of metal, at the top of the pipe, by way of adjutage, will suffer the water to spout higher than when it is cylindrical or conical.

Expe-



Experience also shews, that the bigness of the pipe of the adjutage should be enlarged at and near the surface of the water in the reservoir, and that such pipe should be much larger than the adjutage; also, that there is a certain length among the several diameters of the adjutages, which will give the spout the greatest height possible, and which must not exceed an inch and a quarter. Likewise, the height of the spout must have its limits, an hundred feet being almost as much as it will bear.

Let AB (*plate II. fig 1.*) be the height of a cistern filled with water, which bisect in C, about the centre C with the radius CB, describe the semicircle ADB: now, if E be an adjutage in the side of the cistern, and ED be drawn perpendicular to AB, also BG, upon the horizontal plane, and taken equal to 2 ED, the water will run out from E to G, which may be thus proved. It is well known that EHF, the curve which the water issuing from the aperture at E describes in its fall, is the common parabola; also that the velocity of the effluent water at E must, in order that it may describe the said parabola, be equal to that which a heavy body would acquire by falling through a height equal to  $\frac{1}{2}$  of its parameter. See PROJECTILE.

But since this velocity is acquired by the descent through AE, it follows that AE must be  $\frac{1}{2}$  of the parameter, or, which is the same thing,  $AE = \frac{BG^2}{4 BE}$ . By the foregoing construction we have  $CB^2 - CE^2 = ED^2$ ,  $CB - CE = AE$ , and  $BG = 2 ED$ , consequently  $BG^2 = 4 ED^2$ , therefore  $AE = \frac{ED^2}{BE}$ , that is,  $CB - CE = \frac{ED^2}{BE}$ , for  $ED^2$  puts its equal  $CB^2 - CE^2$ , we have  $CB - CE = \frac{CB^2 - CE^2}{BE}$  divide each side by  $CB - CE$ , there will arise  $1 = \frac{CB + CE}{BE}$  or  $BE = CB + CE$ , which being manifest, by the figure, proves the above construction to be just.

Hence it follows, that a liquid spouting from a hole in the centre C, will go to the greatest distance possible; and that all apertures equally above and below the centre C, have exactly the same amplitudes upon the horizontal plane. Let the areas of the bases of two unequal cylindrical vessels of water, be called B and b, their heights A and a, D and d the areas of the holes or adjutages through which they are evacuated, T and t the times of running respectively; then the quantities run out from those cylinders (constantly kept full), in the times T and t will be in the proportion of  $T \times \sqrt{H} \times D$  to  $t \times \sqrt{h} \times d$ . Wherefore, expounding those quantities by Q and q, we shall have  $T \times \sqrt{H} \times D : t \times \sqrt{h} \times d :: Q : q$ . If  $Q : q :: B \times H : b \times h$ , then  $T \times \sqrt{H} \times D : t \times \sqrt{h} \times d :: B \times H : b \times h$ , and by multiplying extremes and means we get  $T \times \sqrt{H} \times D \times b \times h = t \times \sqrt{h} \times d \times B \times H$ , whence  $T \times D \times b \sqrt{h} = t \times d \times B \times \sqrt{H}$ . From these equations may be deduced the following corollaries.

1. The squares of the quantities flowing out from the same adjutage in equal times, are in the ratio of the heights of the liquid above the aperture. For when  $T = t$ , and  $D = d$ ,  $Q^2 : q^2 :: H : h$ .

2. The times in which cylindrical vessels of the same diameter and height are emptied, the liquid flowing from unequal apertures, are in the inverse ratio of the areas of those apertures. For  $T : t :: d : D$  when  $H = h$  and  $B = b$ .

3. Cylindrical vessels of unequal bases, but of equal heights, are emptied through equal apertures in times that are in the ratio of their bases. For  $T : t :: B : b$ , when  $H = h$  and  $D = d$ .

4. The times in which any cylindrical vessels are evacuated, are in a ratio compounded of the bases, the inverse ratio of the apertures, and direct ratio of the square roots of the heights. For  $T : t :: B \times d \times \sqrt{H} : b \times D \times \sqrt{h}$ .

If the side of a cylindrical vessel, beginning from the

base be divided into lengths, which are as 1, 4, 9, 16, &c. viz. the squares of the natural numbers, 1, 2, 3, 4, &c. the surface of the water (running out through an hole or aperture at the bottom) will descend from each of those divisions to the next, in the same time.

In the above investigations, we always suppose the velocity of the effluent water to remain constant during the evacuation; and therefore, when we speak of the time of emptying a cylindrical vessel, we only mean that time in which (the vessel being kept constantly full) a quantity of the liquid, equal in magnitude to the capacity of the vessel, will flow through the adjutage, or aperture, in the side of the perpendicular cylinder.

AJUTANT. See ADJUTANT.

ALA, in botany, the hollow of the stalk, which either the leaf, or the pedicle of the leaf, makes with the stalk or branches. It is also applied to leaves consisting of many lobes or wings.

ALABASTRA, in botany, a name given to the calyx of flowers before they are expanded, particularly to the rose-bud.

ALABASTER, in natural history, a genus of fossils resembling marble, which are bright, brittle, and do not give fire with steel; they ferment with acids, and readily calcine with heat. There are three species of alabaster; 1. The snow-white shining alabaster, or lydium of the ancients, is found in Taurus in pieces large enough to make dishes, or the like. It cuts very freely, and is capable of a fine polish. 2. The yellowish alabaster, or phengites of Pliny, is found in Greece, and is of a soft loose open texture, pretty heavy, and nearly of the colour of honey. This species has likewise been found in Germany, France, and in Derbyshire in England. 3. Variegated, yellow, and reddish alabaster. This species is the common alabaster of the ancients, and is so soft that it may be cut with a knife: It is remarkably bright, and almost transparent; admits of a fine polish, and consists of large angular sparry concretions. It is not proof against water; it ferments violently with aqua-fortis, and burns to a pale yellow. The ground of this species is a clear pale yellow, resembling amber, and variegated with undulated veins; some of which are pale red, others whitish, and others of a pale brown. It was formerly brought from Egypt, but is now to be met with in several parts of England. The alabasters frequently used by statuaries for small statues, vases, and columns. After being calcined and mixed with water, they may be cast in any mould like plaster of Paris.

ALA-MI-RE, in musick, the name of a note in the modern scale of musick. See GAMUT.

ALAMODE, the name of a very thin, glossy, black silk, chiefly used for hoods, scarfs, &c.

ALARM, in the military art, denotes either the apprehension of being suddenly attacked, or the notice thereof, signified by firing a canon, firelock, or the like.

False alarms are frequently made use of to harass the enemy, by keeping them constantly under arms. Sometimes also this method is taken to try the vigilance of the piquet-guard, and what might be expected from them in case of real danger.

ALARM-bell, that rung upon any sudden emergency, as a fire, mutiny, or the like.

ALARM-post, or ALARM-place, the ground for drawing up each regiment in case of an alarm. This is otherwise called *the rendezvous*.

ALARM, in fencing, is the same with what is otherwise called an appel, or challenge.

ALATED Leaves, in botany, those compounded of several pinnated ones.

ALATERNUS, in botany, the name of a distinct genus of plants, according to Tournefort's system; but comprehended by Linnaeus among the rhamnuses. Its flower consists of one funnel-shaped leaf, divided into four deep segments; and the fruit is a berry, containing, for the most part, three seeds, globose on one side, and angular on the other.

ALBANI, in antiquity, a college of the Sallii, or priests



priests of Mars, so called from Mount Albanus, the place where they resided.

ALBATI, a sort of Christian hermits, who flourished in the year 1399, under the pontificate of Boniface IX. They obtained their name from the white linen they wore.

ALBE, a small piece of money current in Germany, and worth about three-half-pence.

ALBE, in the Roman church, a vestment of white linen, answering to the surplice of our clergy.

ALBERTUS, a gold coin, struck during the administration of Albertus, duke of Austria. It is worth about fourteen shillings sterling.

ALBIGENSES, who were likewise called Waldenses, and may "with the strictest justice," says an eminent historian, "be styled, the morning stars of the Reformation. They were denominated Albigenes and Waldenses from Alby, a city of Languedoc in France, where they abounded in great numbers: and afterwards, about the year 1170, from Peter Valdo, an opulent citizen of Lyons, by whom these excellent people were much countenanced and assisted. Though some suppose them to have acquired the name of Waldenses, quasi Vallenfes, from their being extremely numerous in the valleys of Piedmont. Others, from the German word Walddt, which signifies a wood: woods being their frequent refuge from persecution."

"Their first rise was of very considerable antiquity. The Romish council, assembled, by order of Pope Alexander III. at Tours, in May, 1163, prohibited all persons, under pain of excommunication, from having any intercourse with these people; who are described as teaching and professing "a damnable heresy, long since sprung up in the territory of Toulouse." Van Maestricht assures us, that they wrote against the errors and superstitions of the church of Rome, in the year 1100. According to Pilichdorffius, the Waldenses themselves carried up the date of their commencement as a body, as high as three hundred years after Constantine, i. e. to about the year 637. For my own part, I believe their antiquity to have been higher still. I agree with some of our oldest and best Protestant divines, in considering the Albigenes, or Waldenses (for they were, in fact, one and the same), to have been a branch of that visible church, against which the gates of hell could never totally prevail; and that the uninterrupted succession of apostolical doctrine continued with them, from the primitive times, quite down to the reformation: soon after which period, they seem to have been melted into the common mass of Protestants. Neither does this conjecture limit the extent of the visible church in former ages, to so narrow a compass, as may at first be imagined. For they were, says Poplinarius, "diffused not only throughout all France, in the year 1100, but through almost every country in Europe. And," says he, "to this very day, they have their stubborn partizans in France, Spain, England, Scotland, Italy, Germany, Bohemia, Saxony, Poland, Lithuania, and other nations."

Archbishop Usher, whose enquiries were never superficial, and whose conclusions are never precipitate; lays great stress on a remarkable passage in Reinerius, a popish inquisitor, who died about the year 1259. The passage is this: "Of all the sects which as yet exist, or ever have existed, none is more detrimental to the church," i. e. to the Romish church, "than the sect of the Waldenses. And this on three accounts: 1. Because it is a much more ancient sect, than any other. For, some say, that it has continued ever since the popedom of Silvester: others, that it has subsisted from the time of the Apostles.—2. It is a more extensive sect, than any other: for there is almost no country, in which this sect has not a footing.—3. This sect has a mighty appearance of piety: in as much as they live justly before men, and believe all things rightly concerning God, and all the articles contained in the creed. They only blaspheme the Roman church and clergy," Toplady's *Historic Proof*.

ALBORAK, among the Mahometans, is the name

of the beast on which Mahomet rode in his journey to heaven.

ALBUGINEA. *Tunica*, in anatomy, is the third or internal coat of the testicles, so called from its white colour. It is likewise a name given by some anatomists to one of the coats of the eye, called also adnata. See the article EYE.

ALBUGO, among physicians, signifies a distemper of the eye, caused by a white, dense, and opaque spot, growing on the tunica cornea.

I have, says the learned Dr. Mead, made use of two methods for the cure of this disorder of the sight; the one a topical, and the other an internal medicine. The first consisted of the following powder.

Take of common glass any quantity, pound it in a mortar, into a very fine powder, then add an equal quantity of white sugar-candy and levigate the mixture on a marble with great labour, till it becomes quite impalpable.

A little of this powder, put into the eye with a quill every day, gradually absterges and wears off the spot by its inciding quality. The other method above mentioned of removing this speck is, to order a dexterous surgeon to pare it cautiously every day with a knife; for this tunicle is composed of several lamellæ one over another, and has thickness enough to bear paring off some of its parts. I have seen several instances of cures by the eye-powder, but the paring of the coat has not succeeded with me above once or twice. However, it is better to try a doubtful remedy than none. *Mead's Monita & Præcepta*.

ALBUMEN, among physicians, the white of an egg.

ALBURN, a sort of compound colour formed by a mixture of red and white.

ALCAICS, in ancient poetry, a denomination given to several kinds of verse, from their inventor Alcaus.

The first kind consists of five feet, viz. a spondee, or iambic; an iambic; a long syllable; a dactyle; another dactyle: such is the following verse of Horace,

*Omnes | eo | dem cogimur, | omnium  
Versa | tur ur | nâ | serius | ocys |  
Sors exitura.*

The second kind consists of two dactyles and two trochees: as

*Exili | um imposi | tura | cymbæ.*

Besides these two, which are called dactylic Alcaics, there is another stilled simply Alcaic; consisting of an epitrite; a coriambus; another coriambus; and a bacchius: the following is of this species,

*Cur timet fla | vum Tiberim tangere, cur | olivum?*

ALCAIC Ode, a kind of manly ode, composed of several strophes, each consisting of four verses; the two first of which are always Alcaics of the first kind; the third verse is a diameter hypercatalectic, or consisting of four feet and a long syllable; and the fourth verse is an Alcaic of the second kind. The following strophe is of this species, which Horace calls *minaces Alcaici camenæ*.

*Non possidentem multa vocaveris*

*Rectè beatum: rectius occupat*

*Nomen beati, qui decorum*

*Muneribus sapienter uti, &c. Hor.*

ALCAID, ALCAYDE, or ALCALDE, among the Spaniards and Portuguese, is a magistrate, or officer of justice, nearly answering to our justice of peace.

ALCALI, or ALKALI, among chymists and physicians, an appellation given to all substance which excite a fermentation when mixed with acids.

Originally, the term alkali signified only the salt extracted from the ashes of kali or glass-wort; afterwards, it was used for the salts of all plants, extracted in the same manner; and as these were observed to ferment with acids, the signification of the term was still further extended, so as to comprehend whatever substances had this effect.

Alkalies, or alkaline substances, are therefore of various and widely different kinds. Some are earthy, as quick-lime, marble, and sealed earth; others metalline, as gold, silver, tin, &c. others of animal origin, as shells, bezoars, the calculus humanus, &c. and, lastly, all the stony submarine plants, as coral. Alkalies are either



either fixed, as salt of tartar *per deliquium*; or volatile, as spirit of hartshorn. The fixed may be distinguished from the volatile, as the former will give a red orange colour to a solution of quick-silver by the spirit of nitre; whereas the latter gives to this solution a white milky colour. But every alkaline substance, whether fixed or volatile, being mixed with the juices of turnsol, roses, or violets, presently changes their natural colours to a green. It must be observed, that no vegetables can afford an alkaline salt without the action of fire, on the contrary, if suffered to dry or rot spontaneously, they vanish or change their form, without leaving the least fixed alkali behind. Hence we may conclude, that fixed alkaline salts have their nature imparted to them by fire, and not by any natural vegetable operation.

There is, however, a natural fixed alkali of the mineral kind, namely natrum, which is more common than is generally imagined, and is often found in mineral waters. Of the several kinds of fixed alkalies, the most common is that called by the name of pot-ash.

The gross lee which wines deposit after fermentation, being pressed dry, and burnt to ashes, affords likewise a fixed alkali, which may also be produced from fixed nitre, from tartar and nitre mixed, and regulus of antimony.

It is evident, from repeated experiments, that all fixed alkalies are endowed with the power of attracting water, air, pure alcohol, oil and acids, though of these last, they attract some more strongly than others.

Alkalies are used in medicine to resolve and fuse tenacious coagulations of the juices, to open obstructions, attenuate the fluids, gently stimulate the solids, promote perspiration, sweat, urine, and a discharge of all acid humours, by means of a neutral purgative salt, which they form with the acid in the intestines.

Whether any volatile alkali exists in nature, without the assistance of putrefaction, or distillation, is not easy to determine, but it is certain, that both animal and vegetable substances yield these salts in great plenty. The most remarkable are animal salts, which may be procured by distillation from every animal substance, as hartshorn, blood, silk, cobwebs, &c. The hypothesis of acid and alkali was formerly in great esteem. The patrons of this hypothesis asserted that alkalies and acids were the universal principles of all bodies; and from hence accounted for every phenomenon of nature. But experience has demonstrated their system to be false and insignificant.

ALCANNA, in commerce, a powder prepared from the leaves of the Egyptian privet, in which the inhabitants of Grand Cairo drive a very considerable trade. It is likewise sometimes used for singlafs.

*Knights of* ALCANTARA, a Spanish military order, who obtained great honour during the wars with the Moors.

ALCEA, in botany, the hollyhock, a plant of the mallow kind, well known in England.

ALCHEMILLA, in botany, ladies mantle, a genus of pentandrious plants growing in several parts of England.

ALCHYMIST, a person who professes or practises alchymy.

ALCHYMY, the higher or more abstruse parts of chymistry, relating chiefly to the transmutation of metals. See the article CHYMISTRY.

ALCIS, in mythology, one of the names of Minerva, and under which she was worshipped by the Macedonians.

ALCMANIAN, in the ancient lyric poetry, a species of verse, consisting of two dactyles and two troches.

ALCOHOL, in chymistry, denotes a spirit of wine rectified by repeated distillations, till it has acquired the utmost subtilty and perfection of which it is capable. It is the lightest fluid next to air, perfectly transparent, very thin, most simple, totally inflammable, without producing any smoke, or diffusing any disagreeable smell whilst it is burning; is exceedingly volatile, without leaving any fæces; absolutely immutable in distillation; extremely expandible by heat; very easily disposed to ebullition by fire; of a very pleasant smell, and of a particular grateful taste.

VOL. I. No. 4.

All the humours of the human body we are acquainted with, it coagulates in an instant, except the pure water and urine, whilst it hardens all the solid parts, and thus preserves both from putrefaction, or spontaneous colligation: it preserves the bodies of insects, fish, birds, and other animals that are put into it, from putrefaction, or alteration, for ages, if closely stopped: with water, vinegar, or any acid liquors, oils, and pure volatile alkaline salts, it suffers itself to be mixed, and that nearly with an equal mixture; and gummy and resinous substances it dissolves. So that we are acquainted with no fluid, produced either by nature, or the art of chymistry, that is capable of being united with more bodies than alcohol. But in a particular manner, it proves an excellent vehicle for the spiritus rector of vegetables, which, by uniting with it, may be extracted from its proper body, retained and applied to medicinal and other uses. The great masters of chymistry, distinguished by the title of Adepts, are supposed, in their description of the artificial preparation of this perfect alcohol, to have shadowed out the preparation of the philosopher's stone.

ALCOR, in astronomy, is the Arabic name of a star of the fifth magnitude, adjoining to the large bright star in the middle of the tail of the great bear.

ALCORAN, AL-CORAN, or AL-KORAN, the scripture or bible of the Mahometans.

The Alcoran is divided into 114 large portions or chapters of very unequal lengths, which the Arabians call *Sowar*, a word properly signifying a row, order, or series. These chapters, in the manuscript copies, are not distinguished by their numerical order, but by particular titles, which are sometimes taken from some principal matter treated of, or person mentioned therein, but generally from the first remarkable word, which, in some chapters, is at a great distance from the beginning.

That Mahomet was really the author and chief contriver of this work is beyond dispute, though it is highly probable, that he had no small assistance in his design from others. The general opinion is, that he was assisted chiefly by one Sergius, a Nestorian monk, with whom Mahomet, in his youth, had some conference at Bosra, a city of Syria Damascena, and by a Jew, called Abdallah Ben Salam, who was of a good family in Spahan, and had embraced christianity. The Mahometans, however, absolutely deny that the Alcoran was composed, it being their general and orthodox belief, that it is of divine original; nay, that it is eternal and uncreated, remaining, as some express it, in the very essence of God; that the first transcript has been from eternity by God's throne, written on a table of vast bigness; that a copy from this table, in one volume on paper, was by the ministry of the angel Gabriel, sent down to the lowest heaven in the month of Ramadan, from whence Gabriel revealed it by parcels, some at Mecca and some at Medina, at different times during the space of twenty-three years, as the exigency of affairs required, giving him, however, the consolation of seeing the whole, (which they tell us was bound in silk and adorned with gold and precious stones of paradise) once a year.

ALCOVE, among builders, implies part of a parlour or chamber separated by pillars, pilasters, or other ornaments, and in which is placed either a bed of state, or seats for company.

ALDEBARAN, in astronomy, a star of the first magnitude, called in English the Bull's-eye, as making the eye of the constellation Taurus. Its longitude is 6 deg. 32 min. 0 sec. of Gemini, and its latitude 5 deg. 29 min. 49 sec. south.

ALDER-TREE, *Alnus*, in botany, the name of a genus of trees whose characters are these: the flower is of the amentaceous kind, being composed of several apices, arising from four-leaved cups; these are affixed in a clustering manner to an axis, but these are barren. The young fruit appears in a different part of the tree, is of a squamose structure, and loaded with embryo seeds; this finally increases in size, and becomes a regular fruit, containing a number of compressed seeds.

ALDERMAN, in the British policy, a magistrate

M

subordinate



subordinate to the lord-mayor of a city or town-corporate.

The number of these magistrates is not limited, but is more or less according to the magnitude of the place. In London they are twenty-six; each having one of the wards of the city committed to his care. This office is for life; so that when one of them dies, or resigns, a ward-mote is called, who return two persons, one of whom the lord-mayor and aldermen chuse to supply the vacancy. By the charter of the city of London, all the aldermen who have been lord-mayors, together with the three eldest ones not arrived at that dignity, are justices of the peace.

ALDERMAN, among our Saxon ancestors, was a degree of nobility answering to earl or count at present.

ALDERMAN was also used, in the time of king Edgar, for a judge or justice; in which sense Alwin is called *aldermannus totius Angliæ*.

ALE, a well-known liquor, made from malt. See the article BREWING.

Medicated ALES, are those wherein medicinal herbs have been infused, or added during the fermentation.

ALE-CONNER, an officer in London, who inspects measures used in public houses. There are four ale-conners, who are all chosen by the common-council of the city.

ALE-SILVER, a tax paid annually to the Lord-mayor of London, by all who sell ale within the city.

ALECTORIA, a stone said to be formed in the gall-bladders of old cocks, to which the ancients ascribed many fabulous virtues.

ALECTORICARDITES, the name of a stone resembling a pullet's head.

ALECTROMANCIA, in antiquity, a species of divination performed by means of a cock. It was performed in the following manner, a circle being described on the ground, and divided into twenty-four equal portions, in each of which was written one of the letters of the alphabet, and a grain of wheat placed on each of the letters. This being finished, a cock was turned loose in the circle, and particular notice taken of the grains picked up by the bird; because the letters under them being formed into a word, gave an answer to the question.

A-LEE, in navigation, when a ship leans over to one side more than the other, by the wind thwarting the line of her course, and pressing upon her masts and sails, which act upon her hull with the power of a lever; the side pressed down is called the lee-side: hence when the helm is moved close to it, it is said to be a-lee, or hard a-lee: the other side is then called the weather-side, and the helm being moved over to it, is said to be hard a-weather.

ALEGAR, vinegar made from ale.

ALEMBIC, a chemical vessel usually made of glass or copper for condensing the vapours that arise in distillation; the alembic being properly the head or upper part of the apparatus. See the article DISTILLATION.

ALEPH, the name of the first letter of the Hebrew alphabet. It properly signifies chief, prince, or thousand.

ALESANDERS, or ALEXANDERS, in botany, the English name of a plant, formerly cultivated in kitchen gardens; but at present rarely used.

ALEXANDRINE, in poetry, a kind of verse, consisting of twelve, or thirteen syllables alternately; so called from a poem on the Life of Alexander, written in this kind of verse by some French poet. Our Alexandrine verse answers exactly to the the Trimeter Iambic of the ancients.

ALEXIPHARMICS, among physicians, an appellation given to such medicines as resist poison, and correct or expel the causes of malignant disorders.

Alexipharmics produce their effect chiefly by promoting perspiration, whereby the putrid particles are carried off: they are therefore nearly allied to the diaphoretics.

Alexipharmics agitate and attenuate the humours, on which account they are improper in all cases where these are acrid or too thin; also in all inflammatory disorders, unless administered with great caution. On the

contrary, they are very serviceable in those diseases, which proceed from external cold and obstructed perspiration, as catarrhs, rheumatism, fluxes, coughs, and glandular tumours.

Alexipharmics make a large class of medicines, but the principal ones are these: 1. Of the animal kingdom, hartshorn, bezoars, and the bones and teeth of different animals. 2. Of the vegetable kingdom, the leaves and flowers of all the aromatic plants, especially such as are umbelliferous. 3. Of the mineral kingdom, the different preparations of antimony, the dulcified spirit of vitriol with alcohol.

ALEXITERIAL. See the last article.

ALGA, in botany, a genus of submarine plants, called in English, grass-wreck, and composed of long slender leaves of a dusky-green colour, very much resembling some kinds of grass. There are several species of alga, the most considerable of which is the algamarina, so much used in the glass trade.

ALGAROT, in chymistry, an arabic term for an emetic powder, prepared from regulus of antimony, dissolved in acids, and separated by repeated lotions in warm water.

ALGEBRA, is a general method of computation by certain signs and symbols, which have been contrived for this purpose, and found convenient. It is called an UNIVERSAL ARITHMETICK, and proceeds by operations and rules similar to those in common arithmetick, founded upon the same principles. See *Universal ARITHMETICK*.

ALGEBRAICAL, something that relates to algebra. Thus we say, algebraical characters, or symbols, curves, solutions, &c. See CHARACTER.

ALGEBRAICAL Curve, is a curve wherein the relation of the abscisses to the ordinates may be defined by an algebraical equation. These are also called geometrical lines or curves. Algebraical curves stand contradistinguished to mechanical or transcendental ones. See MECHANICAL and TRANSCENDENTAL.

ALGEBRAIST, a person skilled in the science of algebra.

ALGENEB, a fixed star of the second magnitude, in Perseus's right side; its longitude is 27°, 46', 12", of Taurus, and its latitude 30°, 05', 28", north, according to Mr. Flamsteed's catalogue.

ALGOIDES, a name used by Vaillant for a genus of plants, called, by Linnæus, Zannichellia. See ZANNICHELLIA.

ALGOL, a fixed star of the third magnitude, called Medusa's Head, in the constellation Perseus; its longitude is 21°, 50', 42", of Taurus, and its latitude 22°, 23', 47", north, according to Flamsteed's catalogue.

ALGOR, among medical writers, implies an unusual coldness or chiliness in any part of the body.

ALGORAB, in astronomy, a star of the third magnitude in the right wing of Corvi; it is the seventh according to Flamsteed's catalogue, and marked 9 by Bayer.

ALGORITHM, an Arabick term, signifying the art of numerical computation. Some writers use it to signify the practice of algebra.

ALGUAZIL, in the Spanish police, signifies an officer whose business it is to execute the sentences of the judges.

ALLHEAL, in botany. See the article PANAX.

ALHIDADE, or ALIDADE, the Arabick name for the index of a mathematical instrument for taking altitudes, distances, &c.

ALIAS, in law, a second or even further writ issued from the courts of Westminster, after a capias, &c. has been sued out without effect.

ALIBI, in law, signifies the absence of the person accused; or his being at a distance from the place where the fact was committed, at the very time mentioned in the indictment.

ALIEN, in law, implies a person born in a foreign country, not within the king's dominions, in contradistinction to a denizen or natural-born subject.

An alien is incapable of inheriting lands in England, till naturalized by an act of parliament. No alien is intitled to vote in the choice of members of Parliament, has



has no right to enjoy offices, or can be returned on any jury, unless where an alien is party in a cause; and then the inquest of jurors shall be one half denizens and the other aliens.

**ALIEN DUTY**, an impost laid on all goods imported by aliens, over and above the customs paid for such goods imported by British subjects, and in British ships.

**ALIEN-PRIORIES**, a kind of inferior religious houses formerly very numerous in England, and so called from their being subject to foreign abbeyes.

**ALIENATION**, in law, implies the act of making over a person's property in lands, tenements, &c. to another.

**ALIFORMIS**, in anatomy, the name of a pair of muscles arising from the pterigoide processus. See the article *MUSCLES of the human body*.

**ALIFORMIS Processus**, a name sometimes given to the os cunifforme.

**ALIMA**, in natural history; a kind of sand found in gold mines, and from which lead is extracted.

**ALIMENT**, in a general sense, whatever contributes to the nourishment of a body, whether animal or vegetable.

**ALIMENT**, among physicians, implies every thing capable of nourishing the human body.

The loss we sustain daily makes it necessary that it should be repaired by substances anaiagous to those of our body, such as aliment and drink, the stimulus to which is hunger and thirst.

Experience has sufficiently demonstrated, that the best method of preserving health is to live upon plain simple aliment, lightly seasoned, and in quantity agreeable to the age, strength of the stomach, season of the year, sex, constitution, and chiefly to what nature has found by experience to require: for it is as great a fault to take too much as too little. Perfect digestion is the best rule for regulating a meal, especially if the person is more brisk and lively after a repast than before.

We have examples of many persons, who, by their temperance, have lived to a very advanced age; wherefore those that are fond of life and health should imitate their regimen. Excesses in eating and drinking are extremely pernicious.

Persons of a delicate constitution, or who are just recovered from a disease, should use soft light aliments agreeable to the stomach, for they make the best chyle.

Acid, tenacious, viscous aliment, pies of all kinds, things that are fat, and of a blackish substance, are generally unfit for chylication, or render the chyle bad.

Children whose stomachs are weak, and vessels fine, ought to use a light, slender, thin, soft aliment, easy of digestion: wherefore, infants should be fed with fluid milk, to avoid causing obstructions in their fine and delicate vessels. Consequently, the milk of a nurse newly brought to bed, is more agreeable to infants, than that of one who has been delivered five or six months, and whose milk begins to have too great a consistence. Nurses should observe an exact regimen, and shun all sorts of violent passions; for they disturb digestion, and communicate their bad effects to their children. When infants are weaned, they should not be accustomed to spirituous liquors and strong food, especially the salt and smoke-dried, which are hard of digestion, and yield bad nourishment. The best method is to eat little at a time and often.

In old age the fluids are more thick, the secretions slow, and the solids more stiff than in youth; wherefore, they require less food, and of a more soft, nourishing, moistening kind, easy of digestion, and not too much at a time especially in the evening.

At all times of life, but especially in old age, the constant and immoderate use of salt and smoke-dried meat, acid and aromatic vegetables, as well as spirituous liquors, tend to harden and stiffen the parts of the body, instead of affording good nourishment; besides, the digestion of these aliments is difficult, and render the blood so acrid, as to hurt the capillary vessels.

However, an acquired habit is hard to be left off, and we find many persons enjoy a good state of health when their meat and drink are very indifferent, because they

are become customary, and they are apt to fall sick when they attempt to change their manner of life; for custom is a second nature: all great changes ought to be brought about insensibly.

For this reason, it is good not to contract a habit of any kind; wherefore, persons of a good constitution should live in a various manner, and refuse no kind of aliment; and should sometimes be in town, and sometimes in the country; should use much exercise, and should even now and then exceed the exact bounds of moderation, and at other times omit a meal now and then.

Hunger shews the best time of eating, but custom confines us to certain hours. Persons who find no inconvenience from dining and supping every day, need not change their manner of life. In youth, wherein there is a great dissipation, and in age, where strength is wanting, and when little is eaten at a time, something taken between meals is not amiss. However, it is necessary to observe, that when the stomach is bad, persons should not begin to eat again till the last meal is digested.

When a person is greatly fatigued, and his spirits dissipated, it will be necessary to rest before eating. In cases of distress and sorrow, the aliment should be very light and small in quantity, because, at those times, the body is weak.

In the summer, when the spirits and fluid parts are apt to evaporate, the aliment should be light, moist, fluid, and easy of digestion, to repair the loss with greater speed; whereas, in winter the stomach will admit of grosser food.

**ALIMENTARY**, an epithet applied to every thing relating to aliment or food.

**ALIMENTARY Duct**, a name by which some call the intestines, on account of the food's passing through them.

**ALIMENTARY Duct**, is sometimes used to signify the thoracic duct. See **THORACIC Duct**.

**ALIMONY**, in law, implies that allowance which a married woman sues for and is intitled to, upon any occasional separation from her husband.

**ALIQUNT Part**, in arithmetick, is that number which cannot measure another exactly, without leaving some remainder. Thus 8 is an aliquant part of 20, for twice 8 wants 4 of 20, and three times 8 exceeds 20 by 4.

**ALIQOT Part**, is that part of a number as will divide and measure it exactly without any remainder. For instance, 2 is an aliquot part of 4, 3 of 9, and 4 of 16.

To find all the aliquot parts of a number, divide it by the least divisor, and the quotient by its least divisor, until you get a quotient not further divisible, and you will have all the prime divisors or aliquot parts of the number. Thus 60 divided by 2, gives the quotient 30, which divided by 2 gives 15, and 15 divided by 3, gives the indivisible quotient 5. Hence the prime aliquot parts are 1, 2, 3, 5; and by multiplying any two or three of these together, you will find the compound aliquot parts, viz. 4, 6, 10, 12, 15, 20, 30.

Aliquot parts must be confounded with commensurable ones; for though the former be all commensurable, yet these are not always aliquot parts: thus 4 is commensurable with 6, but is not an aliquot part of it.

**ALITES**, in Roman antiquity, a term applied to such birds as afforded matter for auguries by their flight.

**ALKAHEST**, or **ALCAHEST**, among chymists, denotes an universal menstruum capable of resolving all bodies into their first matter, or *ens primum*; and that without suffering any change, or diminution of force by so doing.

Van Helmont assures us, in the most positive manner, that he himself was master of such a menstruum; concerning which many have been the opinions and hypotheses of chymists. Some have had sanguine expectations of finding an alkahest in sea-salt, and mercury; others from nitre; in short, there are few bodies, but some one or other has fixed on as the subject of his researches after this so much famed menstruum.

But



But the most general opinion is, that it is to be obtained from human urine. We are told, that the matter of this dissolvent is both base and precious; that it costs nothing; that all men have it in their power; that Adam carried it with him when he went out of Paradise; that it is concealed in the microcosm, and very powerful in the macrocosm; in short, that it is human urine.

Parcelsus uses no synonymous terms for the alkehest; but Helmont calls it *ignis aqua*, *ignis gehennæ*, and *summum et felicissimum omnium salium*. He adds, that it was no natural production, but solely to be obtained by art.

Alkehest, according to Starkey, is composed of three principles; a volatile urinous salt; an intermediate spirit, or essential oil of urine; and an acid no wise corrosive, which is nothing but the vinous spirit of urine. When the oily spirit has coagulated the salt, both are to be dissolved by the vinous spirit, which will likewise unite with them by fermentation. This operation is to be repeated, till the whole becomes an entirely fiery and spirituous essence, or what is the same thing, a salt without phlegm.

Various other processes are delivered, by different authors, for obtaining an alkahest; which, it is said, will transmute stones, gems, metals, and in general, all bodies whatever, whether belonging to the animal, vegetable, or mineral kingdom, into an actual salt, equal in quantity to their whole bulk.

It is an observation of Boerhaave, that nothing in all nature is more surprising than the change of bodies attributed to the action of this menstruum; inasmuch as they are changed into a quite different matter, without losing any of their virtues or weight in the operation. By means of alkahest, the most solid bodies, not excepting gold and gems, are said to be changed into a saline volatile substance, which contains all their virtues, and is capable of mixing with animal fluids. In this state they become potable, in the true sense of the word; for what the chymists mean by potable gold, is only gold reduced to a saline and soluble substance, capable of circulating through all the vessels of the human body.

Another equally surprising property of alkahest, is its being able to dissolve all these bodies, without mixing with, or suffering any change from them; so that it must produce its effects, by only acting externally upon the subject.

After all, many great chymists have doubted whether it be possible to obtain such an universal menstruum, as the alkahest is represented to be. Those who desire a more particular account of the alkahest, may consult Boerhaave's elements of chymistry; also Starkey, Pelletier, Juncker, Baldwin, &c. who have all treated of this subject.

ALKAHEST is sometimes also used for all fixed salts, volatilized; in which sense, it differs widely from the universal solvent.

ALKAHESTIC, a term sometimes applied to all powerful menstrua, as being supposed to partake of the alkahest.

ALKALI, or ALCALI. See the article ALCALI.

ALKANET, in botany, the English name of a genus of plants called Anchusa. See ANCHUSA.

ALKEKENGI, in botany, the winter cherry; a low and somewhat hairy plant, with imbranched stalks; large heart-shaped acuminate leaves, standing in pairs at the joints, and whitish bell-shaped flowers, rising in the bosoms of the leaves, divided about the edges into five segments; the flower-cup changes into a pentagonal capsule or bladder, which, bursting, discovers in its bottom a red fruit like a cherry, containing numerous small seeds with a juicy pulp. It grows wild in some parts of Europe; and spreads so much in our gardens as not to be easily extirpated. The fruit ripens about the beginning of October, and sometimes continues to near the end of December; after which the plant dies to the ground.

Winter cherries have an acidulous not unpleasant taste, mixed with, or followed by a slight bitterness: the covering in which they are inclosed, has a strong

pungent bitterness, with which it is apt to impregnate the cherries, unless some care is taken in gathering them. As medical writers in general speak of this fruit as being very bitter, we may presume that it has been often used with this extraneous bitter impregnation.

Those cherries are accounted powerful diuretics, operating without heat or irritation, and which may therefore be ventured on in inflammatory distempers: five or six of the cherries in substance, or an ounce of the expressed juice, are directed for a dose. They are said to be, in some places, eaten, among common people, by handfuls, and with good success, against suppressions of urine, and for promoting the expulsion of mucus and gravel. Mr. Ray tells us of a gouty person who was cured, and kept free from the returns of his disorder, by taking eight of these cherries at each change of the moon; and that the operation of the medicine procured a discharge of extremely fetid matter by urine. The cherries may be dried so as to be pulverable, or the depurated juice, inspissated with a gentle heat to the consistence of a rob, or extract, and in this state preserved for use.

ALKERMES, in pharmacy, a compound cordial medicine, the principal ingredient in which is kermes. It was formerly prescribed pretty frequently; but it is now rarely called for. See KERMES.

ALKORAN. See the article ALCORAN.

ALKY of Lead, a name given by some chymists to fugar of lead.

ALL-SAINTS, a festival observed by most denominations of Christians, in commemoration of the saints in general. It is kept on the first day of November.

ALL-SOULS, a festival kept on the second day of November, in commemoration of all the faithful deceased.

ALLA, or ALLAH, the adorable Being, the common name of God, among the Mahometans.

ALLANTOIS, or ALLANTOIDES, in anatomy, a vesicle investing the foetus of several animals, and containing an urinous liquor, supposed to be conveyed thither from the urachus.

The word is Greek, and compounded of *αλλας*, a gut, and *ειδος*, resemblance.

Antomists are not agreed whether the allantois has or has not any existence in the human species.

ALLAY, or ALLOY. See ALLOY.

ALLEGATA, in Roman antiquity, a kind of inscription used by the emperors, importing the writings to be verified.

ALLEGATION, in law, signifies the producing instruments or deeds, to authorise or justify some fact or assertion. In matters of literature, is the quoting an author in regard to the subject in hand.

ALLEGIANCE, in law, implies the obedience which every subject ought to pay to his lawful sovereign.

Oath of ALLEGIANCE, is that taken by the subject, by which he acknowledges the king his lawful sovereign.

ALLEGORICAL, something belonging to, or partaking of, the nature of an allegory. See the article ALLEGORY.

ALLEGORICAL Poetry, is that where some useful moral is conveyed under the veil of fiction and allegory.

The most beautiful poem of this kind in ours, or perhaps in any other language, is Spenser's Fairy Queen.

This species of poetry permits the largest scope and latitude to the genius: the fancy of the poet, winged with the wildest enthusiasm, may fly out beyond the bounds of space; it may give "to airy nothing a local habitation and a name." Not contented with personifying the virtues, vices, passions, and all the natural and moral qualities, it often darts into the fairy land of fiction; and, with more than magic power, conjures up a new creation of monstrous dragons, enchanted castles, and tremendous giants. Yet "rolling in this fine frenzy," the eye of the poet must still watch the moral: however wild and romantic his inventions are, the mystical meaning of his fable must appear under the veil



veil distinct and intelligible. It is this, and this only, which can justify him, when he transports us beyond the bounds of nature into an ideal region, whose inhabitants are all apparitions, whose very rocks have voice and language, and whose trees drop tears of blood.

ALLEGORIST, one who deals in allegories: such were many of the Christian fathers.

ALLEGORY, in composition, consists in chusing a secondary subject, having all its properties and circumstances resembling those of the principal subject, and describing the former in such a manner as to represent the latter. The principal subject is thus kept out of view, and we are left to discover it by reflection. In other words, an allegory is, in every respect, similar to an hieroglyphical painting, excepting only that words are used instead of colours. Their effects are precisely the same: an hieroglyphic raises two images in the mind; one seen, that represents one that is not seen: an allegory does the same; the representative subject is described; and the resemblance leads us to apply the description to the subject represented.

There cannot be a finer or more correct allegory than the following, in which a vineyard is made to represent God's own people the Jews.

"Thou hast brought a vine out of Egypt; thou hast cast out the heathen and planted it. Thou preparedst room before it, and didst cause it to take deep root, and it filled the land. The hills are covered with the shadow of it, and the boughs thereof were like the goodly cedars. She sent out her boughs unto the sea, and her branches unto the river. Why hast thou then broken down her hedges, so that all they which pass by the way, do pluck her? The boar out of the wood doth waste it, and the wild beast of the field doth devour it. Return, we beseech thee, O God of hosts: look down from heaven, and behold, and visit this vine, and the vineyard which thy right hand hath planted, and the branch that thou madest strong for thyself." Psalm lxxx.

Nothing gives greater pleasure than an allegory, when the representative subject bears a strong analogy, in all its circumstances, to that which is represented. But most writers are unlucky in their choice, the analogy being generally so faint and obscure, as rather to puzzle than to please. Allegories, as well as metaphors and similes, are unnatural in expressing any severe passion which totally occupies the mind. For this reason the following speech of Macbeth is justly condemned by the learned author of the Elements of Criticism:

Methought I heard a Voice cry, Sleep no more!  
Macbeth doth murder Sleep; the innocent Sleep;  
Sleep that knits up the ravell'd Sleeve of Care,  
The Birth of each Day's Life, fore Labour's Bath,  
Balm of hurt Minds, great Nature's second Course,  
Chief Nourisher in Life's Feast. Act ii. Sc. 3.

ALLEGRO, in musick, an Italian word, denoting that the part is to be played in a sprightly, brisk, lively, and gay manner.

*Piu* ALLEGRO, signifies, that the part it is joined to should be sung or played quicker; as

*Poco piu* ALLEGRO, intimates, that the part to which it refers, ought to be played or sung only a little more briskly than allegro alone requires.

ALLELUJAH, an expression of joy or praise often made use of in scripture. It is an Hebrew word, and literally signifies, "Praise the Lord."

ALLELUJAH, in botany, an obsolete name for the oxys.

ALLERION, in heraldry, a kind of eagle, without beak or feet, having nothing perfect but the wings.

ALLEVEURE, a small brass Swedish coin, worth about two-pence half-penny.

ALLEY, in gardening, a strait parallel walk, bounded on both sides with trees, shrubs, &c. and usually covered with gravel or turf.

An alley should be broad enough for two persons to walk a-breast, and is distinguished by its breadth from a path. It should not be less than five, nor more than fifteen feet broad.

VOL. I. No. 5.

Covered ALLEY, that where the trees meet at the top, and form a shade.

ALLEY, in *Compartment*; that which divides the squares of a parterre.

ALLEY, in perspective, that which in order to give it a greater appearance of length, is made wider at the entrance than at the termination.

ALLIANCE, in the civil and canon law, implies the relation contracted between two persons, or two families, by marriage.

ALLIANCE, is also used to signify a treaty entered into by sovereign princes and states, for their mutual safety and defence.

In this sense alliances may be distinguished into such as are offensive, whereby the contracting parties oblige themselves jointly to attack some other power: and into such as are defensive, whereby the contracting powers bind themselves to stand by and defend one another, in case of being attacked by any other power.

ALLIANCE, in a figurative sense, is applied to any kind of union or connection.

ALLIGATI, in Roman antiquity, the basest of all their slaves, and who were usually kept fettered.

ALLIGATION, in arithmetick, is the rule, whereby questions relating to the mixture of commodities, and the value of the composition, are solved.

ALLIGATION is divided into two kinds, medial, and alternate.

ALLIGATION *Medial*, is that by which the mean rate or price of any mixture is found, when the particular quantities of the mixture and their rates are given.

To answer questions of this nature, the sum of all the quantities proposed to be mixed, and also the sum of their particular rates, must be found. — Then the proportion will be,

As the sum of all the quantities, is to the sum of all their rates; so is any part of the mixture, to the mean rate or price of that part.

*Examp.* A goldsmith mixes 6 ounces of silver at 5s. per ounce, with 9 ounces at 3s. 9d. per ounce: what is the value of an ounce of that composition?

The question prepared as above directed will stand,

Thus  $\left\{ \begin{array}{l} 6 \frac{3}{4} \text{ at } 5s. \text{ per ounce} \\ 9 \frac{3}{4} \text{ at } 3s. 9d. \end{array} \right. \begin{array}{l} \text{—} \\ \text{—} \end{array} \begin{array}{l} \text{comes to } 360 d. \\ \text{comes to } 450 d. \end{array}$

$15 \frac{3}{4} = \text{their sum. And their total value} = 810 d.$   
 $\frac{3}{4} d. \quad \frac{3}{4} d. \quad s. d.$

Then, as  $15 : 810 :: 1 : 54 = 4. 6$ , the answer required.

ALLIGATION *Alternate*, is that by which the particular quantities of each ingredient concerned in any mixture are found; when the particular rates of every one of these ingredients, and the mean rate, are given. — This admits of three cases.

Case 1. The particular parts of any ingredients proposed to be mixed, and the mean rate of the whole mixture being given; to find how much of each ingredient is requisite to compose the mixture, when the whole quantity, or any part thereof, is not limited.

To solve questions of this nature it will be requisite to place the mean rate so, that it may be easily compared with the particular rates, in order to find every one of their differences from the mean rate by inspection only.

Then take the several differences between the mean rate, and the particular rates; setting down those differences alternately, and they will be the quantities required.

Case 2. The particular rates of all the ingredients proposed to be mixed, the mean rate of the whole mixture, and any one of the quantities to be mixed being given; to find how much of each of the other ingredients is requisite to compose the mixture.

In this case, which is usually called *Alligation partial*, you must set down all the particular rates, with their mean rate, and find their differences, as before, without having any regard to the quantity given. — Then the proportion will be,

As the quantity found by the differences, of the same name with the quantity given, is to the given quantity:

N

fo



so is any of the other quantities found by the differences, to the quantity of its name.

Case 3. The particular rates of all the ingredients proposed to be mixed, and the sum of all their quantities, with the mean rate of that sum, being given; to find the particular quantities of the mixture.

This is generally called *Alligation total*, and is thus performed.—Set down all the particular rates, with their mean rate, and find their differences, as before; and add all the differences into one sum.—Then the proportion will be,

As the sum of all the differences is to the sum of all the quantities given: so is every particular difference, to its particular quantity required.

The following example will be sufficient to explain the above precepts.

Suppose it were required to mix malaga, at 7s. 6d. the gallon, with canary at 6s. 9d. sherry at 5s. and white-wine at 4s. 3d. so that the whole mixture may be 90 gallons, to be sold at six shillings the gallon: How much of each sort will be necessary to compose this mixture?

Mean price 72 d.	{	Malaga 90 d.	—	21
		White 51 d.	—	18
		Canary 81 d.	—	12
		Sherry 60 d.	—	9

60 = their sum.

Then {  $60:90::21:31\frac{1}{2}$  the gallons of malaga.  
 $60:90::18:27$  the gallons of white-wine.  
 $60:90::12:18$  the gallons of canary.  
 $60:90::9:13\frac{1}{2}$  the gallons of sherry.

Note. The work of these proportions may be greatly shortened, by dividing the second number by the first, and multiplying that quotient by the respective third numbers; for these products will answer the question.

ALLIGATOR, in natural history, an amphibious creature common in South-America, supposed by some authors to be the same with the crocodile found in Asia and Africa. Its head is long, and slender towards the extremity, gradually forming a snout like that of a hog. Both the upper and lower jaws have a row of very strong and pointed teeth.

These creatures abound in the river of Guaiquil in South-America, and when tired of fishing leave the water to bask in the sun, where they appear more like logs of half rotten wood thrown ashore by the current, than living creatures; but upon perceiving any vessels near them, they immediately plunge into the water. Some of them are of so monstrous a size, as to exceed five yards in length. During the time they lie basking on the shore, they keep their huge mouths wide open, till filled with muschetos, flies, and other insects, when they suddenly shut their jaws, and swallow their prey. Its whole body is covered with scales impenetrable to a musket-ball, unless it happens to hit them in the belly near the fore-legs, the only part vulnerable.

ALLIOTH, a star in the tail of the great bear, much used for finding the latitude at sea.

ALLIUM, garlick, in botany. See GARLICK.

ALLOCATION, implies the admitting or allowing of an article of an account especially in the Exchequer.

ALLOCATIONE *Facienda*, a writ directed to the Lord Treasurer, or barons of the Exchequer, commanding them to allow an accountant such sums as he has lawfully expended in the execution of his office.

ALLOCATO *Comutato*, a new writ of exigent issued before any other county court is held, on account of the former not being complied with.

ALLOCUTION, in Roman antiquity, implies an harangue made by a general to his army.

ALLODIAL, an epithet given to an inheritance held without any acknowledgment to any lord or superior, in opposition to feudal. It is now generally called freehold.

ALLODIUM, free lands, or such as are absolutely the property of their owner, without his being obliged to pay any acknowledgment whatsoever.

ALLOWANCES, at the custom-house, to goods rated by weight, are two, viz. draught and tare.

ALLOY, or ALLAY, a proportion of a baser metal mixed with a finer one. Thus all gold coin has an alloy of silver and copper, as silver coin has of copper alone; the proportion in the former case, for standard gold, being two carrats of alloy in a pound troy of gold; and, in the latter eighteen penny-weight of alloy for a pound of silver.

ALLUM, See ALUM.

ALLUMINOR, from the French *allumer*, a person who colours or paints upon vellum or paper.

ALLUSION, in rhetoric, a figure by which something is applied to, or understood of another, on account of some similitude between them.

ALLUVION, among civilians, denote the gradual increase of lands along the sea-shore, or on the banks of rivers.

This, when slow and imperceptible, is considered as a lawful acquisition; but when a considerable portion of land is torn away at once by the violence of the current, and joined to a neighbouring estate, it may be claimed again by the former owner.

ALLY, in matters of polity, implies a sovereign prince or state, that has entered into alliance with others.

ALMACANTARS, in astronomy, are lesser circles of the sphere, parallel to the horizon, and imagined to pass through every point of the meridian.

They are of use in shewing the heights or altitudes of the heavenly bodies, and described on some quadrants, &c. They are generally called parallels of altitude.

ALMADIE, a kind of canoe, or small vessel about 24 feet long, made of the bark of a tree, and used by the negroes of Africa. It is also the name of a long-boat used at Calcutta, near eighty feet long, and six or seven broad.

ALMAGEST, the name of a celebrated book composed by Ptolemy. It contains a great variety of geometrical problems, and many astronomical observations made by the ancients.

ALMANACK, in matters of literature, a table containing the calendar of days and months, the rising and setting of the sun, the age of the moon, &c.

Regiomontanus is allowed to have been the first who reduced almanacks to their present form.

*Construction of ALMANACKS.* The first thing to be done is, to compute the sun's and moon's place for each day of the year, or it may be taken from some ephemerides and entered in the almanack; next, find the dominical letter, and, by means thereof, distribute the calendar into weeks; then, having computed the time of easter, by it fix the other moveable feasts; adding the immoveable ones, with the names of the martyrs, the rising and setting of each luminary, the length of day and night, the aspects of the planets, the phases of the moon, and the sun's entrance into the cardinal points of the ecliptick, *i. e.* the two equinoxes and solstices.

ALMANDINE, a name given by ancient naturalists to the carbuncle.

*Herefy of ALMARIC*, broached in France by one Almaric, in the year 1209. It consisted in affirming, that every Christian was actually a member of Christ; and that without this faith no one could be saved.

His followers are said to have affirmed, that the power of the Father lasted only during the continuance of the Mosaic law; that the coming of Christ introduced a new law; that at the end of this began the reign of the Holy Ghost; and that now confession and the sacraments were at an end, and that every one is to be saved by the internal operations of the Holy Spirit alone, without any external act of religion.

ALMENE, in commerce, a weight of two pounds used in weighing saffron in several parts of the East-Indies.

ALMERAB, among the Mahometan customs, a nich in their mosques, pointing towards the temple of Mecca.

ALMOND, the fruit of the almond-tree. See the next article.

ALMOND-TREE, *amygdalus*, in botany, the English name of a distinct genus of trees, with rosaceous flowers,



flowers, and an oblong stony fruit, in which is included a kernel of the same shape. This genus belongs to the *icosandria-monogynia* class of Linnaeus, who makes it comprehend both the *amygdalus* and *persica*, or peach-tree, of other botanists. Of the several species of almonds, the sweet and bitter kinds are most used in medicine; the former being reputed cooling, healing, emollient, and nutritive; and the latter, aperient, detergent, and diuretic.

We have several preparations of almonds, as blanched almonds, or those which have been steeped in warm water, till they dropped out of their shells; butter of almonds, made by adding blanched almonds to a preparation of cream and the whites of eggs boiled together; almond-milk, made of sweet blanched almonds boiled in fair water, and frequently used as a cooler; and so in other instances.

*Ethiopian* ALMOND, a name sometimes used for a distinct genus of plants, called by Linnaeus *brabejum*. See the article *BRABEJUM*.

ALMOND, in commerce, a measure by which the Portuguese sell their oil: twenty-six almonds make a pipe.

ALMONDS, *amygdalæ*, in anatomy a name sometimes given to the two glands, more usually called tonsils. See the article *TONSILS*.

ALMOND-FURNACE, among refiners, that in which the slags of litharge, left in refining silver, are reduced to lead again, by the help of charcoal.

ALMOND is also a name given to pieces of rock-crystal, which lapidaries use in adorning branch-candlesticks, &c. on account of the resemblance they bear to the fruit of the same name.

ALMONER, an officer appointed to distribute alms to the poor.

*Lord* ALMONER, or *Lord-high* ALMONER of England, is an ecclesiastical officer, generally a bishop, who has the forfeiture of all deodands; and the goods of felons, which he is to distribute among the poor.

He has also, by virtue of an ancient custom, the power of giving the first dish from the king's table to whatever poor person he pleases, or, instead of it, an alms in money.

ALMS, *eleemosynæ*, a general term for what is given out of charity to the poor.

In the early ages of christianity, the alms of the charitable were divided into four parts, one of which was allotted to the bishop, another to the priests, and a third to the deacons and sub-deacons, which made their whole subsistence; the fourth part was employed in relieving the poor, and in repairing the churches.

ALMUCANTARS. See *ALMACANTARS*.

ALMUG-TREE, mentioned in scripture, is supposed to be the same with that which produces the gum arabick.

ALNAGE, or AULNAGE, in the British customs, the measuring of woollen manufactures with an ell.

Alnage was at first intended as a proof of the goodness of the commodity, and therefore a seal was invented as a signal, that the commodity was made according to the statute. But now, that these seals may be bought and affixed to whatever commodity the buyer pleases, our rivals have acquired an opportunity of supplanting our trade with foreign nations, to the great prejudice of our woollen manufactures.

ALNAGER, in the English polity, a publick sworn officer, whose business is to examine into the assize of all woollen cloth made throughout the kingdom, and to fix seals upon them. Another branch of his office is to collect an alnage-duty to the king.

There are now three officers relating to the alnage, namely, a searcher, measurer, and alnager; all which were formerly comprized in the alnager, until by his own neglect it was thought proper to separate these offices.

ALNUS, in botany, the alder-tree. See *ALDER-TREE*.

ALNUS, in the ancient theatres, was the part most distant from the stage.

ALOOF, in navigation, keep aloof, (commonly

called keep the luff) is the command given by the pilot or officer to the helmsman, to direct the ship's course nearer the wind, or nearer that point of the compass which the wind blows from. This phrase probably regards the dangers of a lee-shore, from which the pilot might order the helmsman to "keep aloof."

ALOE, in botany, a genus of the hexandria monogynia class. The characters are: The corolla is erect, open at the top, and the nectarium at the bottom of it; the filaments of the stamina are inserted in the receptacle, the leaves are thick, succulent, and for the most part beset with bristles; the fruit is oblong and cylindrical, and divided into three cells, which contain flat semicircular seeds. There are eight species of the aloe, viz. the *perfoliata*, *variegata*, *disticha*, *spiralis*, *viscosa*, *pumila*, *uvaria*, and *retusa*, most of them natives of Africa. The *retusa*, or pearl aloe, is a very beautiful plant. It is smaller than most of the aloe kind. The leaves are short, very thick, sharp pointed, and turning down with a large thick end, appear there triangular. The colour of the leaves is a fine green, striped in an elegant manner with white, and frequently tipped with red at the point. The flower-stalk, which rises in the midst of the leaves, is round, smooth, of a purple colour, and generally about eight inches high. When the plant has been properly cultivated, the flowers are striped with green and white; and sometimes they are entirely white. This aloe is singular in not having the bitter resinous juice with which the leaves of most others abound; when a leaf of this species is cut, what runs from it is watery, colourless, and perfectly insipid. Linnaeus says that this plant thrives best in a clay soil, and that it grows wild in the clay-grounds of Africa.

The inspissated juice of the aloe is a stimulating cathartick bitter, and is used in various forms, for cleansing the primæ viæ, attenuating and resolving viscid juices, for promoting the uterine and hæmorrhoidal fluxes, killing worms, &c.

ALOES, in the materia medica, a gummy resinous juice extracted from the leaves, &c. of the aloe; and of which there are three different species found in the shops, distinguished by the names of *socotorine*, *hepatick*, and *caballine*.

*Socotorine* ALOES, are brought from the island Socotora, in the Indian ocean, wrapt in skins; and obtained from the *aloe socoterina angustifolia spinosa flore purpureo*. This sort of aloes is of a bright surface, and in some degree pellucid, in the lump; of a yellowish red colour, with a purplish cast; when reduced into powder, of a golden colour. It is hard and friable in the winter; somewhat pliable in the summer, and softens betwixt the fingers. Its bitter taste is accompanied with an aromattick flavour, but not sufficient to prevent its being disagreeable: the smell is not very unpleasant, and somewhat resembles that of myrrh.

*Hepatick* ALOES, called also Barbadoes, or the common aloes, are brought from the above island; the best sorts in large goured shells; an inferior kind in pots, and a still worse kind in casks. This sort of aloes is darker coloured than that of socotora, and not so clear and bright. Its smell is much stronger, and more disagreeable; the taste intensely bitter and nauseous, with little of the aromattick flavour of the socotorine.

*Caballine* ALOES, called also horse aloes, is generally supposed to be prepared from the dregs or fæces of the hepatick, the difference not being in purity, but in quality. It is easily distinguished from both the foregoing by its strong rank smell: in other respects it agrees pretty much with the hepatick; and is, not unfrequently, sold in its place. Sometimes it is prepared so pure and bright as scarce to be distinguishable by the eye, even from the socotorine; but its offensive smell readily betrays it: and if this also should be dissipated by art, its wanting the aromattick flavour of the finer aloes will be sufficient criterion.

ALOES *Wood*, *lignum aloes*, or *xylo-aloes*, in botany. See the Article *XYLO-ALOES*.

ALOETICKS, in pharmacy, a general name for all medicines, the basis or principal ingredient of which is aloes.



**ALOGIONS**, in ecclesiastical history, a sect of ancient hereticks, who denied that Jesus Christ was the Logos, or Eternal Word; and therefore they rejected the gospel of St. John as a spurious production.

**ALOIDES**, in botany, a name used by some authors for a genus of plants, called by Linnæus *stratiotes*. See the article **STRATIOTES**.

**ALOPECIA**, in medicine, implies a falling off of the hair, occasioned by a defect of nourishment, or a bad state of the humours.

Some make a distinction between the *alopecia* and *defluvium capillorum*, as in the former, certain spots are left entirely bald; whereas in the latter, the hair only grows excessively thin. They likewise distinguish it from the *ophiasis*, as the baldness in this last creeps in spiral lines about the head, like the windings of a serpent. The intention of cure, however, seems to be much the same in them all, viz. to supply proper nourishment, where that is wanting; and to correct the bad qualities of the humours, where these are in fault.

To prevent the hair from falling off by degrees, the head is to be washed every night, at going to bed, with a ley, prepared by boiling the ashes of vine branches in red wine. A powder made by reducing hermodactyles to fine flour, is also recommended for the same purpose.

In cases where the baldness is total, a quantity of the finest burdock roots are to be bruised in a marble mortar, and then boiled in white wine till there remains only as much as will cover them. This liquor, carefully strained off, is said to cure baldness, by washing the head every night, with some of it warm. A ley made by boiling of vine branches in common water, is also recommended with this intention. A fresh cut onion rubbed on the part till it be red, and itch, is likewise said to cure baldness.

**ALOPECURUS**, fox-tail-grass, in botany, a distinct genus of plants, the flower of which consists of only one hollow valve, with a long awn or beard inserted on its hinder part; near the base the germen is round, supporting styles, and containing a single round seed.

**ALP**, a name given to the bullfinch in several parts of England.

**ALPHA**, the name of the first letter of the Greek alphabet, answering to our A.

The alphia, when compounded with other words, is frequently used in a privative or negative sense, answering to the English particle *in* or *un*; thus *agamus alphi*, signifies *unmarried*, being compounded of the privative *α* and *γαμ*; marriage. Sometimes, however, it augments the signification of the words it is compounded with, as *αλι*, *valde robustus*.

As a numeral, alpha stands for one, thus, A', or the first of any thing, as omega for the last: both which together, viz. A and Ω, denote the eternity of God.

**ALPHABET**, the natural or customary series of the several letters of a language.

The word is formed from *alpha*, and *beta*, the first and second letters of the Greek alphabet.

The number of letters is different in the alphabets of different languages. The English alphabet contains 24 letters, to which if we add *j* and *v* consonant, the sum will be 26; the French 23; the Hebrew, Chaldee, Syriac and Samaritan, 22 each; the Arabick 28; the Persian 31; the Turkish 33; the Georgian 36; the Coptic 32; the Muscovite 43; the Greek 24; the Latin 22; the Slavonic 27; the Dutch 26; the Spanish 27; the Italian 20; the Ethiopic, and Tartarian, each 202; the Indians of Bengal 21; the Baramese 19. The Chinese have, properly speaking, no alphabet, except we call their whole language by that name; their letters are words, or rather hieroglyphicks, amounting to about 80,000.

As alphabets were not contrived with design, or according to the just rules of analogy and reason, but have been successively framed, and altered as occasion required, it is not surprising that many grievous complaints have been heard of their deficiencies, and divers attempts made to establish new and more adequate ones in their place; in which none ever better succeeded,

than Bishop Wilkins and M. Lodowic in their universal alphabets of characters.

**ALPHABET** is also used to signify a table of the usual letters of the alphabet, with corresponding secret characters, and other secret symbols, intended to render the writing more difficult to be decyphered.

**ALPHABET**, among merchants, implies a kind of index, with the twenty four letters ranged in their natural order, against which are wrote the names of those who have open accounts, referring to the folios in the ledger, &c.

**ALPHABETICAL**, something belonging to, or ranged in the manner of the alphabet.

**ALPHONSIN**, in surgery, an instrument for extracting bullets from gun-shot wounds.

This instrument derives its name from the inventor Alphonfus Ferrier, a physician of Naples. It consists of three branches, which are closed by a ring. When closed and introduced into the wound, the operator draws back the ring towards the handle, upon which the branches opening take hold of the ball; and then the ring is pushed from the haft, by which means the branches grasp the ball so firmly as to extract the ball from the wound.

**ALPHONSINE Tables**, in astronomy, astronomical tables computed by order of Alphonfus king of Castile, an excellent astronomer: that prince is even said to have assisted in the computation.

**ALPHOS**, among physicians, implies a disease of the skin. When the skin is anywise covered with white spots, it is called *leuce* & *vittigo*, and is considered as a symptom of the leprosy.

**ALRAMECH**, in astronomy, a star of the first magnitude, otherwise called arcturus. See **ARCTURUS**.

**ALSINE**, chickweed, in botany, a small, creeping, juicy herb: annual, yet common in all times of the year in shady cultivated ground.

**ALT**, in musick, a term used to signify the high notes in the scale.

**ALTAR**, a place upon which sacrifices were anciently offered to some deity.

As sacrifices offered up to God are as ancient as the world, altars are of no less antiquity. The scripture in some places speaks of altars erected by the patriarchs, without describing the form or matter of them. The altar which Jacob set up at Bethel was nothing but a stone which had served him for a pillow. Gideon sacrificed upon nothing better than a stone which was before his house. The first altars which God commanded Moses to raise to him must have been of earth, or rough stones; and the Lord declared to him, that if any use were made of iron in them they would be impure. The altar of burnt-offerings which he caused some time after to be made, was a kind of trunk of Shittim-wood, hollow, and covered over with plates of brass.

The altar which Moses enjoined Joshua to build upon mount Ebal, was to be of unpolished stones; and it is very probable, that those which were built afterwards by Samuel, Saul, and David, were of the same structure. The altar which Solomon erected in the temple was of brass, but filled, as is believed, with rough stones. It was twenty cubits long, twenty wide, and ten in height. Lastly, that which was built at Jerusalem by Zerubbabel, and other Jews who returned from Babylon, was only of rough stones: nor was that which the Maccabees rebuilt any better. Josephus says, that the altar which in his time was in the temple was of rough stones, fifteen cubits high, forty long, and as many in width.

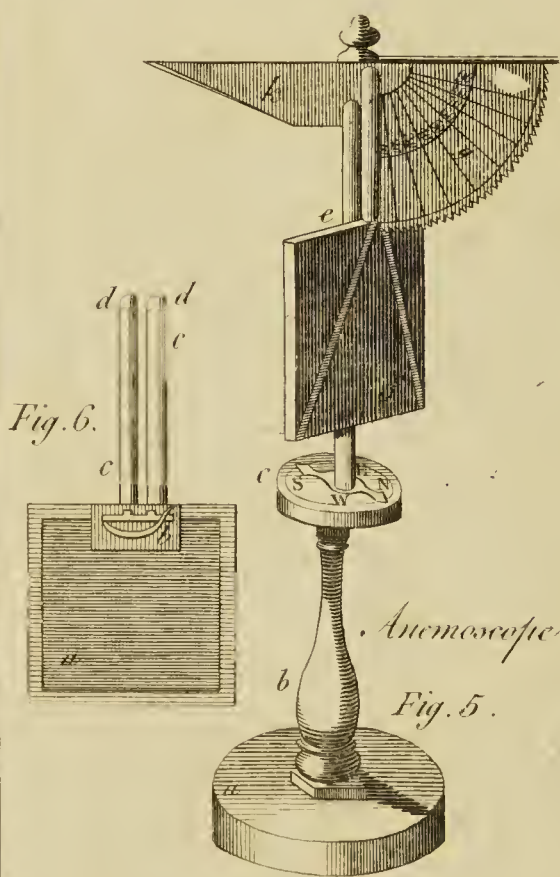
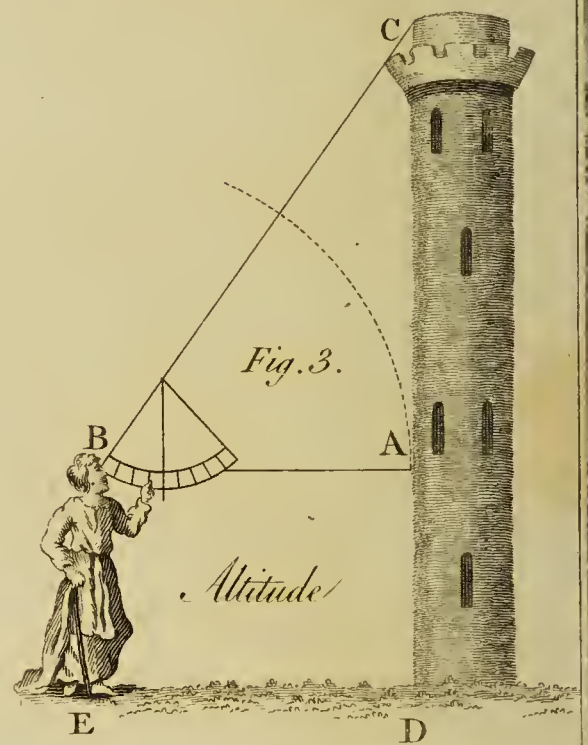
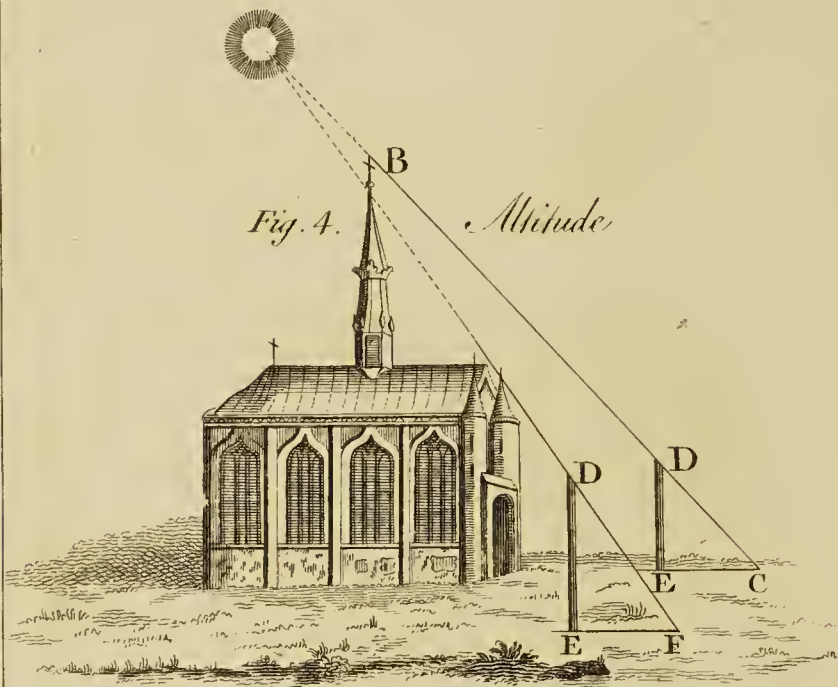
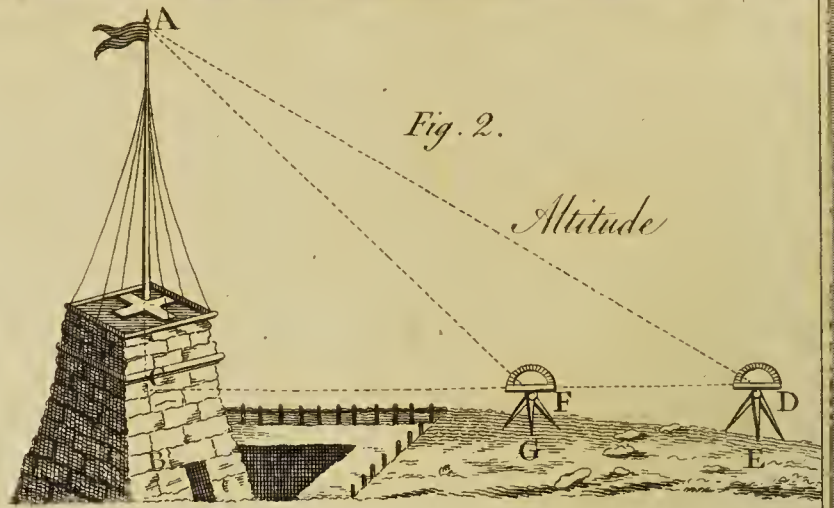
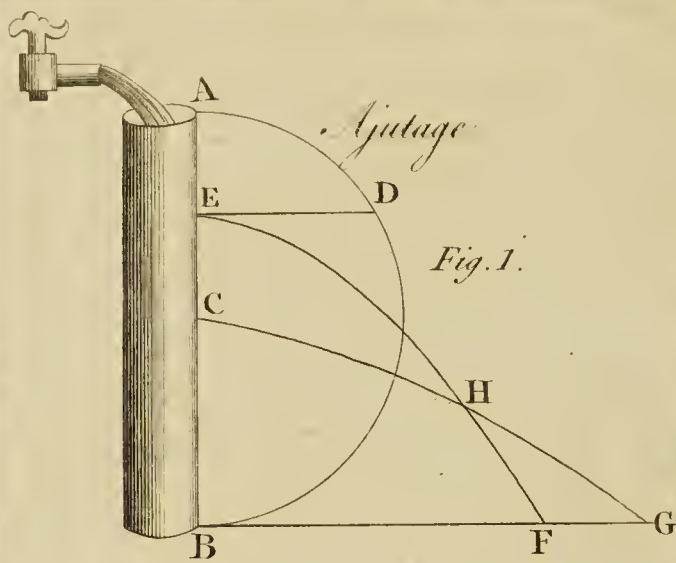
**ALTAR of Incense**. This was a small table of Shittim-wood, covered with plates of gold, of one cubit in length, another in width, and two in height. At the four corners, were four kinds of horns, and all round a little border or crown over it. This was the altar hidden by Jeremiah before the captivity; and upon it the officiating priest offered, every morning and evening, incense of a particular composition.

**ALTAR of Burnt-Offerings** was made of Shittim-wood, and carried upon the shoulders of the priests by slaves

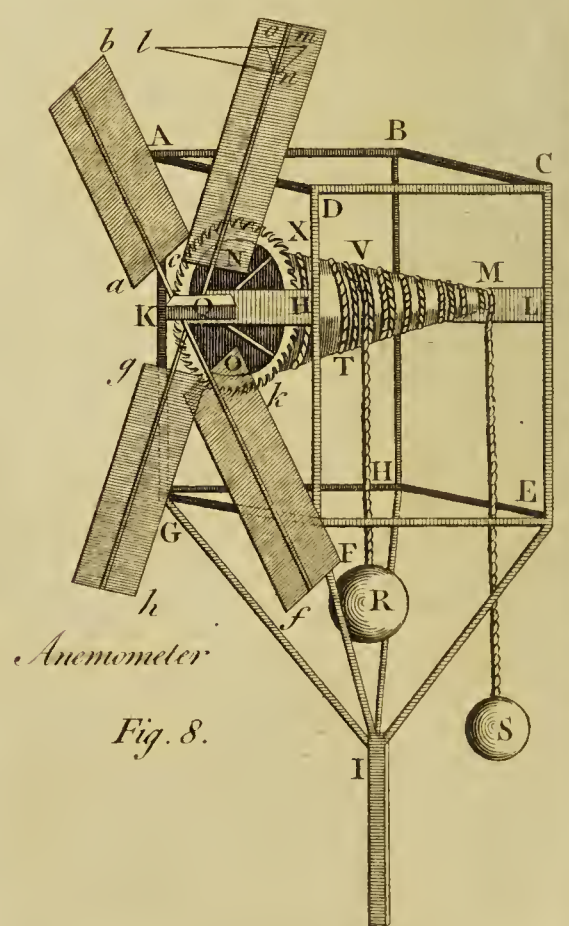








*Fig. 7. Admiral Shells*





flaves of the same wood, overlaid with brafs. In the time of Mofes, this altar was five cubits fquare, and three high; but in Solomon's temple it was much larger, being twenty cubits fquare, and ten in height. It was covered with brafs, and at each corner was a horn or fpire wrought out of the fame wood with the altar, to which the facrifices were tied. Within the hollow was a grate of brafs, on which the fire was made; through it fell the afhes, and were received in a pan below. At the four corners of the grate were four rings, and four chains, which kept it up at the horns.

ALTAR, or Table, for the Shew-Bread, a fmall table of Shittim-wood, overlaid with plates of gold, having a little border round it, adorned with fculpture. It was two cubits long, one cubit wide, and one and a half in height. Upon this table, which flood in the Holy of Holies, were put, every fabbath day, twelve loaves, with falt and incenfe.

The Jewifh altars, after the return from the captivity, and the building of the fecond temple, were in fome refpects different from thofe defcribed above.

That of burnt-offerings was a large pile, built of unhewn ftones, thirty-two cubits fquare at the bottom, and twenty-four fquare at the top. The afcent was by a gentle rifing, thirty-two cubits in length, and fixteen in breadth.

Altars differed, as to their height, according to the different gods to whom they were confecrated: for the Θεοι οὐρανοῖ, or Celeftial Gods, had their altars raifed to a very great height above the ground; infomuch that Pausanius tells us, that the altar of Olympian Jupiter was almoft twenty-two feet high. To the terreftrial gods and heroes, they facrificed upon altars almoft clofe to the ground; and they dug a hole in the earth for thofe of the infernal gods.

Altars ferved as places of refuge, or fanctuary, to all thofe who fled to them, whatever crimes they had committed. Romulus was the firft who appointed thefe places of refuge in the temples, that by this means he might people his new city: and the privileges of thefe fanctuaries came to fo great a height, that, at Rome, and in the cities of Greece, the temples were filled with debtors, fugitive flaves, and criminals, in defiance of the civil power, which could not force them from the altars.

ALTAR is alfo ufed, for the communion-table, in the reformed churches.

ALTAR is fometimes alfo ufed to denote the offerings made at the altar, in contradiftinction from the fettled revenues of a church, called fimplly *ecclefia*.

ALTAR, *ara*, in aftronomy. See *ARA*.

ALTARAGE, among ecclefiaftical writers, denotes the profits arifing to a prieft on account of the altar, as well as the offerings themfelves made upon it.

ALTERANTS, ALTERATIVES, or ALTERATIVE Medicines, fuch as correct the bad qualities of the blood, and other humours, without occafioning any fenfible evacuation.

ALTERATION, in a general fenfe, denotes fome variation in the qualities or circumftances of a thing, without wholly changing its nature.

ALTERATION, in medicine, is particularly ufed to denote the action of alterant medicines. See *ALTERANTS*.

ALTERNATE, in a general fenfe; a term applied to fuch perfons or things as fucceed each other by turns.

ALTERNATE, in heraldry, is faid with refpect to the fituation of the quarters. Thus the firft and fourth quarters, and the fecond and third, are ufually of the fame nature, and then called alternate quarters.

ALTERNATE, in botany, when the leaves or branches of plants arife higher on oppofite fides alternately.

ALTERNATE Angles, in geometry. See *ANGLE*.

ALTERNATE Proportion. See *PROPORTION*.

ALTERNATIONS, properly fignifies a fucceffion by turns. See *ALTERNATE*. In arithmetick, it fignifies the different ways by which a number of quantities may be changed or combined. See *COMBINATION*.

VOL. I. No. 5.

ALTHÆA, marfhmallows, in botany, a genus of plants, with a double calyx, the exterior one being divided into nine fegments; the fruit confifts of numerous capfules, each containing a fingle feed. It belongs to the monadelphia polyandria clafs of Linnaeus. Its flowers and fruit are nearly the fame with thofe of the *malva*, or mallow.

Althæa is much ufed as an emollient. The root and leaves are of great ufe againft fharp corroding humours in the ftomach; alfo balfamic and pectoral, and are often ordered in clyfters for the ftone, and in cataplafms, and fomentations againft fwellings.

ALTIMETRY, the art of meafuring altitudes or heights, whether accessible or inaccessible. See the article *ALTITUDE*.

The word is compounded of the Latin, *altus*, high, and the Greek, μέτρον, to meafure.

ALTITUDE, *Altitudo*, in geometry, the third dimenfion of body, confidered with regard to its elevation above the ground; called alfo height or depth.

The word is derived from the Latin, *altus*, high.

ALTITUDE, of a figure, is the neareft diftance of its vertex from its bafe, or the length of a perpendicular let fall from the vertex to the bafe.

The altitude of objects upon the earth, are either accessible, or inaccessible. They are faid to be accessible when we can meafure the diftance between any ftation and the foot of the object, or to that point where the perpendicular from the vertex falls. On the contrary, they are faid to be inaccessible, when we cannot meafure to the foot of the object, by reafon of fome impediment, as a river, rock, &c.

To take an accessible ALTITUDE, let C (plate II. fig. 3.) represent a tower ftanding upon level ground, whole height is required. With a chain or ftaff of a known length, meafure the diftance between your ftation at E and D, the foot of the tower, which fuppofe equal to 100 feet. Then holding the quadrant in a horizontal pofition, look through the fights at the tower, and where the vifual ray terminates make a mark, as at A, which will fhew the height of the eye above D, the bottom of the tower. Then elevate the inftrument till C, the top of the tower, is feen through the fights. Now, it is plain that the triangle BAC is formed by thefe three lines, viz. BA, the diftance of the obferver's eye from the tower, CA, the height of the tower above his eye, and BC, a line drawn from his eye to the top of the tower. In this triangle the angle A is a right-one by the fuppofition, the angle B is found by the quadrant, which fuppofe 60°, and the meafure of one fide, BA, is known, viz. 100 feet; whence AC may be eafily found; for, if BA be made radius, then AC will be the tangent of the angle B. Therefore, as radius : AB :: tang. ang. BAC : AC = 173, 2; and confequently, if AD, the height of the obferver's eye from the ground, be added, you will have the whole height of the tower CD.

The height of any accessible object may be found, by means of its fhadow, in the following manner. Let the fhadow of the fteeple (plate II. fig. 4.) be extended to C, and let the diftance from C to the centre of the fteeple on the pavement of the church be meafured. Then erect a ftaff, or walking cane DE perpendicular, fo that the extremities of the fhadows of the ftaff and the fteeple may coincide at C; meafure the length of the ftaff DE, and alfo the diftance EC: then it will be as CE, the length of the fhadow of the ftaff, is to DE, the height of the ftaff; fo is the diftance from C to the centre of the fteeple (or the length of the fteeple's fhadow,) to the height of the fteeple. In the fame manner may the height of any of the pinnacles of the church be found, by erecting a ftaff DE, fo that the fhadow of D may coincide with the extremity of the fhadow at F; and meafuring the length of the ftaff DE, the diftance EF, and alfo the diftance from F to the foot of the pinnacle: for it will be, as the length of the fhadow of the ftaff, is to the height of the ftaff; fo is the length of the fhadow of the pinnacle, to the height of the pinnacle.

To take an inaccessible ALTITUDE. Let AB, (plate II.



II: *fig. 2.*) be an object whose height is required. To do this, make choice of two stations E and G, and measure the stationary distance  $GE=FD$ . Take the angles ADC, and AFC, with any proper instrument, as before in finding an accessible altitude. Now the two visual lines DA and FA, together with the stationary distance DF, form an oblique-angled triangle, wherein there are given the three angles and one side; for the angle AFC, subtracted from 180 deg. gives the angle AFD: and angle AFD + angle ADC, taken from 180 deg. gives the angle FAD. Then to find the side AF, it will be, as the angle FAD:FD::angle FDA:AF. Then in the right angled triangle ACF, the angles, and the hypotenuse AF are given: it will therefore be as rad. AF::ang. AFC:CA. To which if we add the height of the instruments  $DC=FG=CB$ , we shall have the height of the object required.

ALTITUDE in optics, is the height of an object above a line, drawn parallel to the horizon from the eye of the observer.

ALTITUDE, of the eye, in perspective, is its perpendicular height above the geometrical plane.

ALTITUDE of a star, &c. in astronomy, is an arch of a vertical circle, intercepted between the star and the horizon.

ALTITUDE of motion, according to Dr. Wallis, is its measure estimated in the line of direction of the moving force.

ALTITUDE, in astrology. See EXALTATION.

ALTITUDE of fluids, is more usually expressed by the term depth.

Determinative ALTITUDE, that from whence a heavy body falling, acquires a certain velocity by its natural acceleration.

ALTO, and BASSO, in law, denotes the absolute submission of all differences high and low to some arbitrator.

ALTO-RELIEVO. See RELIEVO.

ALTO RIPIENO, in musick, the tenor of the grand chorus, which sings or plays only occasionally in some particular places.

ALVARID, in the history of Spain, a kind of magistrate or judge, differing very little from the alcaid.

ALVARISTS, in ecclesiastical history, a branch of Thomists, so called from Alvares their leader; who asserted sufficient grace, instead of the efficacious grace of the ancient Thomists.

ALUDELS, in chymistry, are earthen pots ranged one above another, for retaining the flowers which ascend in the process of sublimation. The lowest aludel is fitted to a pot, placed in the surface, wherein is the matter to be sublimed; and at top is a close head, to retain the flowers which ascend highest.

ALVEARIUM, properly signifies a bee-hive, from *alveus*, a channel, or cavity.

ALVEARIUM, in anatomy, the hollow of the outer ear.

ALVEARIUM, in matters of literature, is used in a figurative sense for a collection or thesaurus.

ALVEOLUS, in natural history, the name of the waxen cells in bee-hives.

ALVEOLUS, in anatomy, the sockets in the jaws wherein the teeth are fixed.

ALVEOLUS, in botany, the name of the cells in which the seeds of several plants are ranged.

ALVEOLUS, in natural history, a sea fossil of a conic figure, composed of a number of cells, like bee-hives, joined into each other, with a pipe of communication.

ALVEUS, properly signifies a channel; and hence is used by some anatomists for the tumid lacteal vessels, proceeding from the receptaculum chyli.

ALVEUS, is also used in Roman antiquity, for a kind of boat, fashioned out of the trunk of a single tree: such was that in which Romulus and Remus were exposed.

ALUM, or ALUMEN, in natural history, a peculiar kind of salt, sometimes found pure, but oftener separated from several substances, as a soft reddish stone in Italy, several kinds of earth, and, in England, from

a whitish or bluish stone, called Irish slate. Alum, in medicine, is a powerful astringent. In dying, it fixes the colours upon the stuff. See CHYMISTRY.

Process of making ALUM. At Whitby, in Yorkshire, alum is made thus: having burnt a quantity of the ore with whins, or wood, till it becomes white, then they barrow it in a pit, where it is steeped in water for eight or ten hours. This liquor, or lixivium, is conveyed by troughs to the alum-house, into cisterns, and from them into the pans, where it is boiled about 24 hours. They had a certain quantity of the lee of kelp; the whole is drawn off into a settler; where having remained about an hour, that the sulphur and other dregs may have time to settle to the bottom, it is conveyed into coolers. This done, to every tun of the liquor they add about eight gallons of urine; and having stood four days and nights, till quite cool, the alum begins to crystallize on the sides of the vessel, from which being scraped off, it is washed with fair water, and then thrown in a bing; to let the water drain off. After this it is thrown into a pan, called the roching pan, and there melted; in which state it is conveyed by troughs into tuns, where it stands about 10 days, till perfectly condensed. Then staving the tuns, the alum is taken out, chipped, and carried to the store-houses.

This is what we commonly call roche or rock alum, as being prepared from stones cut from the rocks of the quarry; and stands contradistinguished from the common alum, or that prepared from earths.

Artificial ALUM, that prepared by art, in contradistinction from the native alum. It is also used for alum produced by causing burnt earthen vessels to imbibe a large quantity of oil of vitriol; the effect of which is, that they are thereby reduced to a mucilage, which being exposed to the open air, affords crystals of pure alum. Tobacco-pipes, wetted with spirit of sulphur, likewise afford beautiful crystals of plumose alum.

Burnt ALUM, is that melted in a fire-shovel, or crucible, where it is allowed to bubble till it becomes a white hard substance.

The watery part of the alum being thus expelled, the remainder is left possessed of all its acids, less clogged, and more in a condition to exert its effects. It proves a gentle escharotick, and is used in small quantities mixed with other ingredients, in tooth-powders.

Crude ALUM, that which has undergone no other refinement than what it receives at the alum-works.

Native ALUM or Fossil ALUM, that formed by nature, without the assistance of art.

There are still mines of native alum in the island of Chio, consisting of a kind of vaults, or apartments crusted over with alum, which may be looked upon as exfoliations from the rock.

Plumose ALUM, or Plume ALUM, a kind of natural alum, composed of a sort of threads, or fibres, resembling feathers; whence it has its name.

Prepared ALUM, or Purified ALUM, that which is dissolved in hot rain-water, and afterwards made to crystallize, by evaporating the water.

Roche-ALUM, or Rock-ALUM. See the article Process of making ALUM, *supra*.

Roman ALUM, a sort of rock alum, of a reddish colour, made in the country near Rome.

Saccharine ALUM, is a composition of common alum with rose-water and the whites of eggs, which being boiled to the consistence of a paste, is formed in the shape of a sugar-loaf; hence it obtained its name: it is used as a cosmetic.

Scissile ALUM, the same with plumose alum.

ALUMINOUS, an appellation given to such things as partake of the nature and properties of alum. See ALUM.

ALUMINOUS WATERS, those impregnated, either naturally or artificially, with the virtues of alum.

Of the former kind is the spaw at Scarborough represented to be; and of the latter, the *aqua aluminosa* of the shops.

ALVUS, in anatomy, denotes the lower belly, or venter; but Celsus uses it to signify the belly, relative to stools. Thus, *alvus liquida* is when the feces are liquid, and *alvus adstricta* when the belly is bound.

AL-



**ALWAIDII**, a sect of Mahometans who believe all great crimes to be unpardonable. The alwaidii attribute more to good works, and less to belief, than other Mahometans.

**ALYSSOIDES**, in botany, a synonyme of the following article.

**ALYSSON**, or **ALYSSUM**, in botany, the name of a genus of plants called in English mad-wort: the flowers are of the cruciform kind, and consist of four leaves; the fruit is a small roundish capsule, divided into two cells, in which are contained a number of small roundish seeds. There are 14 species of the alyssum, none of which are natives of Britain.

**ALYTARCHA**, a priest of Antioch, in Syria, who, in the games instituted in honour of the gods, presided over the *αλυται*, or officers who carried rods to clear away the croud, and keep order. In the olympic games, the alytarches had the same command, and obliged every person to preserve order and decency.

**AMA**, among ecclesiastical writers, denotes a vessel in which wine or water were kept for the service of the eucharist.

**AMAIN**, or **AMAYNE**, in the sea-language, a term importing to lower something at once. Thus, to strike amain, is to lower or let fall the top-sails; to wave amain, is to make a signal, by waving a drawn sword, or the like, as a demand that the enemy strike their top-sails. The term amain, is also used in lowering a yard, or letting any thing down into the hold, as a word of command to do it gently, and by degrees.

**AMALGAMA**, in chymistry, a mass of mercury united and incorporated with some metal.

**AMALGAMATION**, in chymistry, the operation of making an amalgam, or of mixing quicksilver with some metal, is performed by fusing, or at least igniting the metal, and in this state adding a proportion of mercury to it; upon which they mutually attract and incorporate with each other.

Of all metals, gold unites with mercury with the greatest facility; next to that, silver; then lead, tin, and every metal, except iron and copper, the last of which incorporates with quicksilver with great difficulty, and the former scarce at all.

The amalgam of gold is thus made: take a dram of the regulus of gold, beat it into very thin plates, and upon these, heated in a crucible red hot, pour an ounce of quicksilver; stir the matter with an iron rod, and when it begins to fume, cast it into an earthen pan filled with water, and it will coagulate and become tractable. Gold will retain about thrice its weight of mercury.

To make an amalgam of lead: melt clean lead in an iron ladle, add to it an equal weight of melted mercury, stir them together with an iron rod, then let them cool, and you will have an uniform mass of a silver colour, somewhat hard, but growing softer and softer by trituration. Put this mass into a glass mortar, grind it, and mix with it any quantity of mercury at pleasure, and it will unite with it, as salt with water.

The amalgam of tin is made exactly in the same manner, and this also may be diluted by the addition of mercury.

To have an amalgam of copper: take a solution of pure copper, made in aqua fortis, so strong that the aqua fortis could dissolve no more of the metal; dilute the solution with twelve times its quantity of fair water; heat the liquor, and put into it polished plates of iron, and the copper will be precipitated in a powder to the bottom, while the iron will be dissolved: proceed thus till the copper is fallen, pour off the liquor, wash the powder with hot water, till it becomes perfectly infipid; then dry the powder, and grind it in a glass mortar with an equal weight of hot quicksilver, and they will unite into an amalgam, which will also receive a further addition of mercury. An amalgam of copper in any other way is very difficult to make.

Pure silver precipitated from aqua fortis, may in the same manner be made into an amalgam.

From these operations, we may perceive, that the making of amalgams is the foundation of the art of gilding, both in gold and silver, and that metals by

that art may be mixed, confounded, and secretly concealed among one another.

**AMALGAMATION** is also used by some in a less proper sense, for a solution of sulphur with mercury.

**AMALTHEA**, in mythology, the goat that suckled Jupiter, and was afterwards, by that god, placed among the stars.

**AMANUS**, in mythology, a god of the ancient Persians, and supposed to have been the sun, whom they worshipped under the image of the perpetual fire.

**AMARANTA**, or **AMARANTE**, an order of knight-hood instituted in the year 1653, by Christina queen of Sweden, in memory of a masquerade, in which she had assumed that name, which literally signifies unfading or immortal.

**AMARANTHUS**, in botany, the name of a genus of plants, sometimes called prince's-feather, the flower of which is rosaceous, and the fruit an oval capsule, containing only one large seed of a roundish compressed shape. All the species of this genus, which belongs to the monœcia-pentandria class of Linnæus, are drying and astringent; accordingly we find the flowers of the common large garden-kind, dried and powdered, recommended in diarrhæas, dysenteries, and hæmorrhages of all kinds, as well as for incontinence of urine.

**Globe-AMARANTH**, a name by which some call the amaranthoides of others. See the next article.

**AMARANTHOIDES**, in botany, a distinct genus of plants, with flosculous flowers collected into a squamose head, and a roundish fruit.

The flowers of the amaranthoides have got the appellation of everlasting; because if gathered in full perfection, and kept in a dry place, they will retain their beauty many years.

**AMARYLLIS**, in botany, a genus of the hexandria monogynia class. The spathe of the amaryllis consists of one leaf, the flower, like other liliaceous plants, has six petals, and the stigma is trifid. There are 12 species of the amaryllis, all of them natives of the warm climates.

**AMATORII Musculi**, in anatomy, those muscles of the eye, which draw them sideways, and assist in the look called ogling.

**AMAUROSIS**, among physicians, a distemper of the eye, otherwise called gutta serena. See **GUTTA SERENA**.

**AMAZON**, warlike woman, who anciently possessed a great part of Asia, and inhabited Scythia near the Mæotis and Tanais. Their name is derived from *αpriv. μασων*, breast, because they cut off their right breasts to enable them to draw the bow, of which they made great use in war.

**AMAZONS**, in a figurative sense, is applied to bees, from their being governed by a queen.

**AMBARVALIA**, in antiquity, a ceremony among the ancient Romans, when, in order to procure from the gods an happy harvest, they conducted the victims thrice round the corn fields in procession.

**AMBASSADOR**, a person sent in a publick character from one sovereign to another.

The word is derived from the low Latin, *ambasciator*, formed from *ambasius*, which among the ancient Gauls signified servant, client, domestick, or officer.

Ambassadors are either ordinary or extraordinary.

**AMBASSADOR Ordinary** is a person residing at another court for keeping up a good intelligence between the two powers, taking care of the interest of his master, and negotiating such affairs as may occasionally happen. Ambassadors of this kind have not been known above two centuries; before that time all ambassadors were extraordinary, and retired as soon as they had finished the affair they were sent to negotiate.

**AMBASSADOR Extraordinary** is a person sent to the court of a foreign power on some particular and pressing affair, as to conclude a peace, or a marriage, make a compliment, &c.

In fact, here is no essential difference between ambassadors ordinary and extraordinary; the motive of their ambassies alone distinguishes them: they are equally entitled to the privileges given to ambassadors by the law of nations.



AMBE, among surgeons, the name of an instrument for reducing dislocated bones.

This instrument has received various improvements at different times, and by different authors. Mr. Freke, late surgeon to St. Bartholomew's hospital, both improved the machine and rendered it portable; we shall therefore give a description of the ambe, according to his construction.

For a representation of this machine, (see plate III. fig. 2.) It consists of two boxes, A, A, joined at the end by two hinges, contains, when folded together, every thing that can possibly be wanted in reducing a dislocated shoulder; and it may so easily be made use of, without the assistance of any other than the surgeon employed, that, (says the ingenious author) I may venture to affirm, a patient may be set down, the instrument applied, and the shoulder reduced, in one minute, ordinarily speaking.

The length of this instrument, when shut up, is one foot eight inches, its breadth nine inches, and its thickness three inches and a quarter. When it is opened, it is kept so by two hooks fixed on the backside of it; and, when one end of it stands on the ground, the other stands high enough to become a fulcrum, or support of the lever B B, which is fixed on a roller *b*, by a large wood-screw, which turning side-ways, as well as with the roller, it obtains a circumrotatory motion, so that it will serve to reduce a luxation, either backward, forward, or downward.

The roller on which the lever is fixed, is just the diameter of the depth of one of the boxes, into which are driven two iron pins, the ends of which are received by the two sides of the box, which are an inch thick.

The lever is two feet four inches long, and is cut off and joined again by two hinges C, to fold up so as to be contained in the boxes. On the backside of it is a hook, to keep it straight; the other end of it is to hang over the roller about an inch and a half, which is to be excavated and covered with buff leather, for the more easy reception of the head of the os humeri.

Two iron cheeks D are screwed on each side of the lever, to receive through them an iron roller, which has two holes through it, to receive two cords coming from a brace F, fixed on the lower head of the os humeri; for on no other part of the arm above the cubit can a bandage for this purpose be useful; for, if it be applied on the muscular part of the arm, it never fails slipping down to the joint, before you can extend the limb.

The iron roller has a square end, on which is fixed a wheel G, within the cheek notched round, which works as a latchet, on a spring ketch underneath the lever, by which it is stopped, as you wind it with a winch; and may at pleasure be let loose, as there shall be occasion for it, by discharging the ketch. We come now to describe the brace F, which, compared with common bandages, is of more consequence than can easily be imagined by unexperienced persons. It consists of a large piece of buff leather, big enough to embrace the arm, sewed on two pieces of strong curved plates, rivetted together, one of them having an eye at each end to fasten two cords in; the other is bent at the ends into two hooks, which are to receive the cords, after they have crossed over the arm above.

In order to keep the patient steady in his chair from coming forward, or letting the scapula rise up on depressing the lever, after the limb is extended by the winch, there must be fixed over the shoulder a girth H, H, with two hooks at the ends of it, long enough to reach to the ground on the other side, where it must be hooked into a ring I, screwed into the floor for that purpose.

AMBER, *Succinum*, or *Electrum*, in natural history, a hard bituminous inflammable substance, brittle, somewhat transparent, generally of a yellowish colour, and when warm sends forth a fragrant bituminous odour. Amber is likewise endowed with an electrical virtue; when rubbed, it attracts straws or other light bodies. The taste of amber is acrid, bituminous, and somewhat astringent. It does not effervesce with acids,

and is soluble in spirit of wine and essential oils. When subjected to a chymical analysis, it first yields a subacid water, afterwards a yellow fetid oil, and a volatile salt: what remains in the retort is a black, light, friable matter, resembling the *bitumen Judaicum*.

Amber is chiefly found in Prussia, and in the Baltic sea, near the shore of Sudavia, where it is found swimming on the surface of the water, and is taken in nets. It is esteemed a powerful medicine in hysterick and hypochondriack cases.—Naturalists are much divided about the origin of amber: some maintaining it to be an animal substance, others a resinous juice oozing from poplars and firs near the shore, and running into the sea. But it has lately been found to be a true bitumen; the veins of which were discovered, by the Prussians, in the bowels of the earth, in the marsh near Kustrin.

AMBERGRIS, or AMBERGREASE, in natural history, is a solid, opaque, ash-coloured, fat, inflammable substance, variegated like marble, remarkably light, rugged and uneven in its surface, and has a fragrant odour when heated. It does not effervesce with acids; melts freely over a fire, into a kind of yellow rosin, and is hardly soluble in spirit of wine. Ambergris is greatly used by perfumers on account of its sweet smell. In medicine it is used for nervous complaints. It is found in great quantities in the Indian ocean, near the Molucca isles, as also near Africa, and sometimes near the northern parts of England, Scotland, and Norway. There has been many different hypotheses concerning the origin of ambergris, but the most probable is that which supposes it to be a fossile bitumen, or naphtha, exuding out of the bowels of the earth, in a fluid form, and distilling into the sea, where it hardens, and floats on the surface.

AMBIENT, a term used for such bodies, especially fluids, as encompass others on all sides: thus, the air is frequently called an ambient fluid, because it is diffused round the earth.

AMBIGENAL *Hyperbola*, a name given by Sir Isaac Newton, to one of the triple hyperbolas of the second order.

AMBIGUITY, in grammar and rhetoric, a defect in language, whereby words are rendered ambiguous, or capable of a double meaning.

AMBIT of a *Figure*, in geometry, is the perimeter, or sum of all the sides that inclose it.

AMBLE, in horsemanship, implies a peculiar kind of pace, wherein a horse's two legs of the same side move at the same time.

AMBLIGONAL, in geometry, an epithet to any body, which has one or more obtuse angles.

AMBO, or AMBON, in ecclesiastical antiquity, a kind of pulpit, or reading-desk, where that part of the divine service called the gradual, was performed.

AMBON, in anatomy, the cartilaginous margin of those sockets into which the prominent bones are inserted, in some species of articulation.

AMBROSIA, among the ancient pagans, signified the solid food of the gods, in contradistinction to their drink, which was called nectar.

The word is Greek, and compounded of *a priv.* and *βροτος*, mortal, because they supposed that whoever eat of it was rendered immortal.

AMBROSIA, in botany, the name of a distinct genus of plants, with flosculous flowers, divided into five segments; but the fruit, which in some measure resembles a club, grows on other parts of the plant.

AMBROSIAN *Office*, in ecclesiastical history, is a particular office or mode of worship, invented by Ambrose, archbishop of Milan, in the fourth century.

AMBUSCADE, or AMBUSH, in the military art, properly denotes a place where soldiers may be concealed, till they find an opportunity to surprise the enemy.

AMBUSTION, in surgery, the same with what we generally call a burn. See the article BURN.

AMEN, in the scripture-language, a solemn formula, or conclusion to all prayer, signifying *so be it*.

The term *amen* is Hebrew, being derived from the verb *aman*, i. e. to be true, faithful, &c. so that, strictly speaking,



speaking, it signifies truth; and, used adverbially, as is frequently done in the gospels, truly or verily. Sometimes it is repeated twice together, and then it stands for the superlative, as *amen, amen, dico vobis*.

The rabbins are of opinion that this word, *Amen*, was formed of the initial letters of the following words, *Adonai, Meleck Neeman*, "The Lord, the faithful King;" which among the Jews was a form of solemn asseveration.

AMENABLE, among lawyers, one who may be ruled or governed.

AMEND, or AMENDE, in the French customs, a pecuniary punishment imposed by a judge for any crime, false prosecution, or groundless appeal.

AMENDE *Honourable*, an infamous kind of punishment inflicted in France, upon traitors, parricides, or sacrilegious persons, in the following manner: the offender being delivered into the hands of the hangman, his shirt is stripped off, and a rope put about his neck, and a taper in his hand; then he is led into court, where he must beg pardon of God, the king, the court, and his country. Sometimes the punishment ends here, but sometimes it is only a prelude to death, or banishment to the galleys.

AMENDE *Honourable*, is a term also used for making a recantation in open court, or in presence of the person injured.

AMENDMENT, in law, signifies the correction of an error committed in a process, which may be amended after judgment, unless the error lies in giving judgment; for in that case it is not amendable, but the party must bring a writ of error.

AMENDMENT, in a literary sense, implies the correction of some impropriety in the former edition of a book.

AMENTACEOUS, in botany, an epithet applied to such flowers as have an aggregate of summits hanging down in the form of a rope or cat's-tail.

AMERCEMENT, or AMERCIAMENT, in law, a pecuniary punishment imposed on offenders at the mercy of the court.

It differs from a fine in being imposed arbitrarily in proportion to the fault; whereas a fine is a certain punishment settled expressly by some statute.

AMETHYST, AMETHYSTUS, a transparent gem of a purple color, arising from a mixture of red and blue. However, their color is various: some have a mixture of yellow, and some resemble red wine and water; but the best kind is transparent and colorless and resembling so much the diamond, that the difference can only be distinguished by the softness of the amethyst. The gem is found of various sizes, from the bulk of a small vetch, to an inch and half in diameter. Its shape is sometimes roundish, sometimes oblong, and sometimes flatted a little on one side; but its most common figure is that of a crystal, composed of four planes, and terminated by a flat short pyramid. The amethyst is found in India, Arabia, Armenia, Ethiopia, Cyprus, Bohemia, Misnia, in Saxony, and other parts of Germany; but as they are generally as soft as crystal, they are not much valued. It may be counterfeited many ways; but the Germans hardly think it worth the counterfeiting.

AMETHYST, in heraldry, a term for the purple colour in the coat of a nobleman, in use with those who blazon by precious stones, instead of metals and colours. This, in a gentleman's escutcheon is called *Purple*, and in those of sovereign princes *Mercury*.

AMIALE, or AMICABLE numbers, such as are mutually equal to the sum of one another's aliquot parts, as the numbers 284 and 220. Van Schouten was the first who gave this name to such numbers, of which it is easily apprehended, there are but very few at least to be set down and manageable by us. For 284 and 220 are the two least, and the two next greater are 18416 and 17296.

AMIANTHUS, in natural history, vulgarly called earth-flax, is a fibrous, flexible, and mineral substance, composed of short, and abrupt filaments.

It is a stony concrete, of the talcky kind, though differing from talck in its external appearance. It is not

near so bright, or so smooth and unctuous; and composed not of leaves or plates, but of long filaments like flax: it has been spun into cloth, and formed into paper, incombustible and indestructible in the fire.

There are some sorts of amianthus whose filaments are rigid and brittle, others more flexible: the first are not at all to be spun or formed into cloth; and the latter with very great difficulty. This manufacture appears to have been known among the ancients, who, according to Pliny, wrapt the corps of the dead in amianthine clothes, to preserve their ashes separate from those of the funeral pile; an use to which they are still said to be applied among the princes of Tartary. The method of preparation, as described by Ciampini in the Philosophical Transactions N<sup>o</sup>. 273, is as follows: the stone is laid to soak in warm water, then opened and divided by the hands, that the earthy matter may be washed out. This earth is white like chalk, and renders the water thick and milky. The ablution being several times repeated, the flax-like filaments are collected and dried; they are most commodiously spun with an addition of flax: two or three filaments of the amianthus are easily twisted along with the flaxen-thread; if the operator's fingers are kept oiled. The cloth also when woven it best preserved by oil from breaking or wasting. On exposure to the fire, the flax and the oil burn out, and the cloth comes out pure and white. Probably from the dissipation of some extraneous matter of this kind proceeded the diminution of weight which an amianthine napkin suffered in the fire, in an experiment made before the Royal Society; for pure amianthus loses nothing. The shorter filaments which separate in washing the stone, may be made into paper in the common manner.

The proprietor of a forge in some parts of France, not named, upon taking down his furnaces to repair them, found a great quantity of this substance at the bottom, which like the native amianthus, was capable of being manufactured either into incombustible linen or paper. Upon a further enquiry, he discovered that both this and the native amianthus is nothing more than calcined iron, deprived of the phlogistick, and that uniting the phlogistick with this, or the fossil amianthus, he can restore it any time to its primitive state of iron.

AMICITIA, in the feudal customs, were lands granted to be enjoyed only so long as the donor pleased.

AMIDSHIPS, among seamen, the middle of the ship, either with regard to her length or breadth; as, put the helm amidships; i. e. at an equal distance from both the sides. She bore down, and her stem took us amidships, i. e. in or near the middle, between the stem and stern, or the two ends.

AMIESTIES, cotton cloths, which come from the East Indies.

AMILICTI, in the ancient Chaldean theology, one of the triads of persons in the third order of the divine hierarchy.

AMIRANTE, in the Spanish polity, a great officer of state, answering to our lord-high-admiral.

AMMI, BISHOP'S WEED, in botany, a genus of the pentandria digynia class. The involucre is pinnated; and the flowers are all hermaphrodite, with radiated petals. There are two species of the ammi, viz. the majus and glaucifolium, both natives of Europe.

AMOCHRYSOS, in natural history, the name of a stone common in Germany, being a species of mica, with gold-colored spangles. Reduced to powder, it is used to strew over writing.

AMMODITES, the sand-eel, in ichthyology, a genus of malacopterygeous fishes.

It has got the appellation ammodytes, from its driving into, or burying itself under the sand.

AMMON, or HAMMON, in mythology, the name of the Egyptian Jupiter, worshipped under the figure of a ram.

*Cornu AMMONIS*. See the article *CORNU Ammonis*.

AMMONIACUM, or Gum AMMONIACUM, in the materia medica, a concrete gunny-refinous juice brought from the East Indies, and generally in large masses.



Both the plant which produces ammoniacum, and the place of its production, are unknown. The best ammoniacum is composed of white, whitish, or yellowish tears baked into masses: the internal parts particularly are whitish; by age it becomes more and more yellow and brown. It easily softens and becomes tough betwixt the fingers. Chewed, it discovers a bitterish, glutinous, not disagreeable, taste. Its smell approaches to that of a mixture of opopanax and galbanum: some resemble it to that of castor, others to that of coriander seeds, and others to that of garlick.

Ammoniacum is accounted deobstruent; promotes urine; and, in large doses, opens the belly. It is given particularly in obstructions of the breast, in cachectick, hydropick, and apoplectick cases, from a scruple to half a diam. It operates more effectually in a liquid form, as that of an emulsion, than in the solid one of pills; but is most commodiously taken in the latter form. It is sometimes dissolved in vinegar: externally it resolves hard swellings. It is purified by dissolving it in vinegar, wine, or water, and straining and inspissating the solution.

*Sal AMMONIACUM* or *Sal AMMONIAC*, in chymistry, a species of volatile salt, greatly used in the chymical preparations, and of which there are two kinds, natural and artificial.

The natural sal ammoniac, used by the ancients, was found in the sands of Lybia, near the temple of Jupiter Ammon. It was supposed to be generated in those sands from the urine of camels. The artificial, or common sal ammoniac, is chiefly brought from Egypt; and though there is hardly a more common drug, it is but very lately we have known in what manner it is made, being procured by sublimation from all sorts of urine of men and beasts, mixed with common salt and foot. It must be chosen white, clear, transparent, dry, and without filth; and when broken, it must appear as if full of needles.

There are several preparations of this salt made use of in the present practice of physick: as,

*Sal AMMONIAC Volatile*, volatile sal ammoniac. This is made by subliming sal ammoniac, mixed with salt of tartar. It is used for pocket smelling-bottles; but Boerhaave, with the greatest appearance of reason, condemns the custom of smelling to these salts, as highly pernicious. Some put aromatics into the retort, which gives it a more agreeable smell. It is prescribed in malignant fevers as a sudorifick.

*Spiritus Salis AMMONIACI*, spirit of sal ammoniac. This is a spirit distilled from sal ammoniac, mixed with salt of tartar, and dissolved in a proper quantity of water. Some use lime instead of salt of tartar, in order to increase its volatility; but this should never be used internally.

The aqua regia, with which so many experiments are made, particularly in dissolving gold, is made from sal ammoniac and nitre.

AMMUNITION, in military affairs, a general name for powder, balls, &c.

AMMUNITION *Bread, Shoes, &c.* such as are served out to the soldiers of an army, garrison, &c.

AMNESTY, in civil policy, implies an act, whereby two parties at variance mutually promise to pardon and bury in oblivion all that is past.

But in a more limited sense it signifies a pardon granted by a prince to his subjects, by which the former promises to forget and annul all that is past.

AMNIOS, in anatomy, a thin pellucid membrane, which surrounds the foetus.

The amnios is an interior membrane contiguous to the exterior one called the chorion, having no vessels, or at the utmost very few; and contains a pellucid glutinous liquor, which flows out upon the breaking of this membrane at the time of delivery.

AMOMUM, in the materia medica, the name of a species of Sium, an aromatick plant, the seed whereof is a powerful diuretic, and aperient; and consequently, esteemed good in nephritick cases, obstructions of the viscera, and suppression of the menses.

As to the amomum of the ancients, it is a congeries of round membranaceous fruits, the external coats of

which are striated like those of the cardamums, but not tough like them. They have no pedicle, but are affixed by their basis to a wooden stem of a fibrous texture, aromatick smell, and acrid taste. The flowers are like those of leucovium, and the leaves like those of briony.

The best amomum is that which is white or reddish, of a diffused substance, with pods full of seed, pondeous and fragrant.

AMORTIZATION, in law, the alienation of lands or tenements to a corporation or fraternity, and their successors.

AMPELITES, CANNEL-COAL, a hard, opaque, fossil, inflammable substance, of a black colour. It does not effervesce with acids; it is capable of a fine polish, and for that reason is turned into a number of toys, as snuff-boxes, and the like.

AMPER, or AMPOR, an Essex term for a phlegmon.

AMPHIARTHROSIS, in anatomy, a term under which some of the moderns comprehend all those junctures of the bones which have a manifest motion; and which differ from the several articulations of the diarthrosis, either with regard to their figure or motion.

AMPHIBIOUS, in zoology, a name given to such animals as live part of their time in the water, and part on the land.

AMPHIBLISTROIDES, in anatomy, a name by which some call the retina of the eye.

AMPHIBOLOGY, in grammar and rhetorick, implies a phrase capable of two different interpretations. Amphibology arises from the order of the phrase rather than from the ambiguous meaning of a word.

AMPHIBRACHYS, in ancient poetry, the name of a foot, consisting of three syllables, whereof that in the middle is long, and the other two short; as; ābīrē.

AMPHICTYONS, in Grecian antiquity, an assembly composed of deputies from the different states of Greece, and resembling, in some measure, the diet of the German empire.

These deputies met regularly at Delphos twice a year, and decided all differences between any of the Grecian states, their determination being held sacred.

AMPHIDRION, in ecclesiastical writers, implies the veil or curtain, which was drawn before the door of the bema, in ancient churches.

AMPHIMACER, in ancient poetry, implies a foot consisting of three syllables, the first and last of which are long, and that in the middle short; as, cāstās.

AMPHIPORÆ, in the naval affairs of the ancients, signified vessels with a prow at each end.

AMPHIPHROSTYLE, in ancient architecture, implied a temple which had four columns in the front, and as many in the back front.

AMPHISBÆNA, in natural history, a kind of serpent found in several parts of the torrid zone; and so called from its having the power of moving with either end forward.

AMPHISCIL, in geography, a name given to the inhabitants of the torrid zone; because their shadows are one part of the year cast towards the north, and the other part towards the south.

AMPHITHEATRE, in antiquity, a spacious edifice, of a circular or oval form, with a number of rising seats, on which the people sat to behold the combats of gladiators, wild beasts, and other sports.

The word is Greek, and compounded of ἀμφι, about, and θέατρον, a theatre.

Amphitheatres were originally built of wood; and Statilius Taurus, in the reign of Augustus, was the first who erected one of stone. The lowest part was called arena, from its being generally strewed with sand, for the conveniency of the combatants: and round the arena were vaults, in which the wild beasts, appointed for the shews, were contained.

Above these cells were erected a large circular peristyle, for accommodating the emperors, senators, and other persons of distinction. Over the peristyle were



were the rows of benches, which were entered by avenues terminated by gates called vomitoria.

AMPHITHEATRE, in gardening, a temple of view, erected on a rising ground, of a semi-circular figure.

They are formed of ever-greens, observing always to plant the lower trees in the front, and the taller behind.

AMPHITURA, in the ancient churches, was the veil or curtain, separating the chancel from the rest of the church.

AMPHITRITE, in zoology, the name of a small naked sea insect, of an oblong figure, with only one tentaculum, resembling a piece of thread.

There are several species of this animal, some of which are marginated, and variously furrowed, so as to bear some resemblance to a quill.

AMPHODONTA, among ancient zoologists, an appellation given to all such animals as have teeth in both jaws.

AMPHORA, in antiquity, a liquid measure in use among the Greeks and Romans.

The Roman amphora contained forty-eight sextaries, and was equal to about seven gallons one pint, English wine measure; and the Grecian or Attic amphora, contained one third more.

AMPHORA was also a dry measure, likewise in use among the Romans, and contained three bushels.

AMPHORA, among the Venetians, the largest measure used for liquids. It contains four bigorzas, the bigorza being four quarts, the quart four sachie, and each sachie four leras; but by wholesale, the amphora is fourteen quarts, and the bigorza three quarts and a half.

AMPHORA, in astronomy, a name sometimes used for one of the twelve signs of the zodiac, more usually called aquarius.

AMPLIFICATION, in rhetorick, the same with exaggeration. See the article EXAGGERATION.

AMPLITUDE, in astronomy, an arch of the horizon intercepted between the east or west point, and the centre of the sun, or a planet at its rising and setting, and so is either north and south, or ortive and occative.

The sun's amplitude, either rising or setting, is found by the globes, by bringing the sun's place to the horizon, either on the east, or west side, and the degrees from the east point, either north or south, are the amplitude required. To find the amplitude trigonometrically, say, as the cosine of the latitude: radius :: sine of the present declination: sine of the amplitude. This problem is useful in navigation, to find the variation of the compass.

Magnetical AMPLITUDE, the different rising or setting of the sun from the east or west points of the compass. It is found by observing the sun, at his rising and setting, by an amplitude compass.

AMPLITUDE of the range of a projectile, the horizontal line, subtending the path in which the projectile moved. See the article PROJECTILE.

AMPLITUDE Compass, in navigation, the same with azimuth compass. See AZIMUTH Compass.

AMPULLA, in antiquity, a round big-bellied vessel, which the ancients used in their baths, to contain oil for anointing their bodies. It also signified a cup made of glass, and sometimes of leather for drinking out of at table.

AMPUTATION, in surgery, the cutting off a limb, or other part of the body, with an instrument.

Though the amputation of limbs is as much as possible to be avoided, yet in many cases it is absolutely necessary to save the patient's life. Such as, 1. When the muscles of the part, or limb, are sphacelated. 2. When the muscles and bones are violently contused and shattered. 3. When there is an incurable caries, or spina ventosa. 4. When a large artery is either totally divided, or so wounded, that the hæmorrhage is not to be stopped without the danger of mortification.

When it is required on account of either of these causes to amputate a limb, the arm for example; two

things must be observed: 1. The place where the amputation is to be made, which should be one or two fingers breadth above the injured part, and never in it. 2. The preparation of the several necessary instruments. The whole apparatus being provided, the patient, assistants, and surgeon being disposed in proper postures, and the tourniquet applied to the arm, the operation is begun by an annular incision made through the skin with a scalpel, upon which the skin is drawn upwards as much as possible. Then the flesh is divided down to the bones with the crooked scalpel, the ligaments between the ulna and radius are cut, and the periosteum are separated from the bones. The last step is to fix the saw so as that it may work upon the bones of the cubitus at the same time. It must also be moved gently at the beginning, but when well entered, the motion may be faster. And thus in one or two minutes, the amputation may be completed.

The business, however, of the surgeon is not at an end here. He is to make a strict compressure and deligation upon the larger arteries, to suppress the hæmorrhage. This is done, by securing the larger arteries by ligature with needle and thread, and the smaller by square compresses of linen, and sometimes, as among the ancients, by the actual cautery. The flesh and ends of the bones, likewise, are to be invested with dossils of dry lint, over which a piece of the fungus called crepitus lupi, with a bolster of tow, are to be fixed and retained on the stump by a wet bladder or plaister; so that the skin may be drawn down to cover the wound, and procure a speedy cicatrification.

AMSDORFIANS, in church-history, a sect of Protestants in the XVIth century, who took their name from Amstdorf their leader. They maintained, that good works were not only unprofitable, but were obstacles to salvation.

AMSEGETES, in Roman antiquity, those whose land bordered upon a publick road.

AMULET, a charm against witchcraft, or diseases, &c.

These amulets were made of stone, metal, simples, animals, and, in short, of every thing that imagination could suggest. Amulets sometimes consisted in strange unmeaning words, characters and sentences.—The ancients were extremely fond of amulets. Notwithstanding the progress of learning and refinement, there is not any country in Europe, even at this day, who do not believe in some charm or other.

AMULETICKS, among physicians; a name given to all medicines which are supposed to act as charms.

AMURCA, the name of an antiquated medicine, prepared by boiling the recement or dregs of oil of olives to the consistence of honey, and used as an astringent.

AMYGDALUS, the almond-tree: See ALMOND-TREE.

ANA, among physicians, denotes a quantity equal to that of the preceding ingredient. It is abbreviated thus, aa; or ā.

ANA among occult philosophers, a term used to denote the human mind; from whence some will have *anasapta*, a dæmon invoked by sick persons, to be derived.

ANABAPTISTS, in ecclesiastical history, a sect of Protestants that sprung up in Germany about the year 1521, immediately after the reformation of Luther. They at first preached up an entire freedom from all subjection to the civil power; but their principal tenet, and that from whence they take their name, consists in re-baptizing all converts to their sect, and condemning infant-baptism.

The word is formed from the Greek, *ana*, again, and *βαπτίζω*, to baptize.

The fanaticism of this sect rose to an amazing height, and many places suffered severely, particularly the town of Munster, which they seized; and one John of Leyden, the king of this New Jerusalem, defended himself in it as long as possible; but the place was at length taken, and that ringleader of the anabaptists put to death in the year 1536. The anabaptists of Friesland and Holland condemned the seditious behaviour of



of their brethren at Munster; though they themselves raised several commotions under the conduct of one Mennon. They were, however, some time after pretty well cured of their principal errors; so that they no longer pretended to inspiration; no longer opposed magistrates; nor preached up a freedom from all subjections, a community of goods, and the like.

They supported their principal tenet from the following words of our Saviour, "He that believeth, and is baptized, shall be saved." Now as adults alone are capable of believing, they argued, that adults only were fit to be baptized. Calvin, and other writers against them, had recourse to the practice of the primitive church, which is clearly on the side of infant baptism. But some drew an argument against them from the scripture, which tells us that children are capable of the kingdom of heaven, and at the same time assures us, that except a man be baptized he cannot enter into the kingdom of God: since therefore, say they, children are capable of entering into the kingdom of God: they also are qualified for being baptized.

The present anabaptists in England differ very little from the other Protestant dissenters, except in the mode and subject of baptism.

ANABASH, in antiquity, expeditious couriers, who carried dispatches of importance.

ANABASIS, among physicians, implies either the increase of a fever in general, or of any particular paroxysm.

ANABIHAZON, in astronomy, the Arabian name given to the southern node of the moon, or Dragon's tail.

ANABROCHISMUS; among the ancient physicians, denotes the removing or taking away offensive hairs, in the eye-lids.

ANACALYPTERIA, in antiquity, festivals observed among the Greeks on the day the bride was permitted to lay aside her veil, and appear in publick.

ANACAMPSEROS, or ground-pine, in botany, one of the species of house-leek.

ANACAMPTERIA, in ecclesiastical antiquity, a kind of small edifices adjacent to the churches, designed for the entertainment of poor travellers.

ANACAMTICK, an epithet applied by the ancients to that part of opticks relating to reflection, now called catopticks. See CATOPTICKS.

It is also applied to reflected sounds or echoes. See ECHO.

ANACARDIUM, in botany, a genus of the decandria monogynia class of which there is but one species, viz. the occidentale, a native of the Indies. The calix is divided into five parts; the flower consists of one quinquefide petal; the fruit is a kidney-shaped nut, inclosed in a fleshy receptacle. The kernel is of the same nature with an almond: The acrid juice contained between the kernels is recommended for tetter and other cutaneous diseases.

ANACATHARSIS, signifies a salivation, or discharge of noxious humours by spitting.

ANACEPHALÆOSIS, in rhetoric, the same with recapitulation. See the article RECAPITULATION.

ANACHORET, in church-history, denotes a hermit, or solitary monk, who retires from the society of mankind into some desert, with a view to avoid the temptations of the world, and to be more at leisure for meditation and prayer.

Such were Paul, Anthony, and Hilarion, the first founders of monastick life, in Egypt and Palestine.

Anachorets, among the Greeks, consist principally of monks, who retire to caves or cells, with the leave of the abbot, and an allowance from the monastery; or who, weary of the fatigues of the monastery, purchase a spot of ground, to which they retreat, never appearing again in the monastery, unless on solemn occasions.

ANACHRONISM, in literature, an error in respect to chronology, whereby an event is placed earlier than it should be.

ANACLASTICKS, that part of opticks which considers of the refraction of light.

ANACLETERIA, in antiquity, a solemn festival celebrated by the ancients, when their kings or princes came of age, and assumed the reins of government. It

is so called, because proclamation being made of this event to the people, they went to salute their prince during the *anacleteria*, and congratulate him upon his new dignity.

ANACREONTICK Verse, in ancient poetry, a species of verse much used by the poet Anacreon. It consists of three feet and an half, usually spondees and iambuses, and sometimes anapests. Such is that of Horace, *Lydia, dic per omnes*.

ANADIPLOSIS, in rhetoric and poetry, a repetition of the last word of a line, or clause of a sentence, in the beginning of the next: thus,

*Pierides, vos hæc facietis maxima Gallo:*

*Gallo; cujus amor, &c.*

*Et matutinis accedula vocibus instat,*

*Vocibus instat, & assiduas jactat ore querelas.*

*If children, then heirs, heirs of God, and joint heirs with Christ.*

ANADIPLOSIS, among physicians, the renewal of a cold fit, in a tertian fever, before the fit is entirely ended.

ANADROMOUS, an epithet applied to such fish as go from the sea into the fresh water to spawn, such as the salmon, &c.

ANAGALIS, *Pempernel*, in botany, a genus of plants resembling chickweed, producing a wheel-shaped monopetalous flower, whose pointal turns to a dry fruit. Anagalis is very detensive, of a heating and drawing quality, whence it extracts splinters out of the flesh; it has the virtue of drying, without mordacity; and, for that reason, is esteemed proper for conglutinating wounds, and helping putrid ulcers.

ANAGNOSTA, or ANAGNOSTES, in antiquity, a kind of literary servants, retained in the families of persons of distinction, whose chief business was to read to them during meals, or at any other time when they were at leisure. The *anagnostæ* were taught to read with clearness, propriety, and good accent. They were in great credit under the emperor Claudius.

ANAGOGICAL, signifies mysterious, transporting, and is used to express whatever elevates the mind.

ANAGOGY, or ANAGOGE, *ἀναγωγή*, among ecclesiastical writers, the elevation of the mind to things celestial and eternal.

ANAGRAM, in matters of literature, a transposition of the letters of some name, whereby a new word is formed, either to the advantage or disadvantage of the person or thing to which the name belongs. Thus from Galenus, is formed Angelus; from James, Sineá; and so of others.

ANAGRAMATIST, a person who is skilled in, or composes anagrams.

ANAGROS, in commerce a measure for grain, used at Seville, and other Spanish towns. Forty-six *anagros*, make about eighty-two bushels English measure.

ANAGYRIS, BEAN-TREFOIL, in botany, a genus of plants with papilionaceous flowers, the vexillum of which is shorter than any of the other petals, and its fruit an oblong pod, containing kidney-like seeds: to this it is to be added, that three leaves stand on every petal. It belongs to the *diadelphia-decandria* class of Linnæus. According to Lemery, the leaves of *anagryris* are laxative, and its seeds emetick.

ANAITES, in theology, a pagan goddess worshipped by the Armenians.

ANALECTA, or ANALECTS, a collection of small pieces, as essays, remarks, &c.

ANALEMMA, in geometry, a projection of the sphere on the plane of the meridian, orthographically made by straight lines and ellipses, the eye being supposed at an infinite distance, and in the east or west points of the horizon.

ANALEMMA, denotes likewise an instrument of brass or wood, upon which this kind of projection is drawn, with an horizon and cursor fitted to it, wherein the solstitial colure, and all circles parallel to it, will be centrick circles; all circles oblique to the eye, will be ellipses; and all circles whose planes pass through the eye, will be right lines.



The use of this instrument is to shew the common astronomical problems, which it will do, though not exactly, unless it be very large.

This instrument is very ancient, Ptolomy having written upon it in a peculiar treatise. As to the method of constructing it, see Agulonius's Opticks, Taquet's Opticks, Witty in his Treatise of the Sphere, and Dechales on the Astrolabe.

ANALEPSIS, among physicians, implies the attemperament or nutrition of an emaciated body.

ANALEPTICKS, in pharmacy, restorative medicines, or such as nourish the body when greatly weakened.

ANALOGICAL, in a general sense, denotes something belonging to, or partaking of the nature of analogy.—Hence,

ANALOGICAL, *Syllogism*, is one whose force chiefly depends on the analogy between the two premises.

ANALOGISM, among logicians, implies the reasoning from the cause to the effect.

ANALOGY, in matters of literature, a certain relation and agreement between two or more things, which in other respects are intirely different: thus the foot of a mountain bears an analogy to the foot of an animal, although they are two very different things.

There is likewise an analogy between things that have some conformity or resemblance to one another: for example, between animals and plants, and between metals and vegetables; but the analogy is still stronger between two different species of certain animals.

Analogy enters much into all our reasoning, and serves to explain and illustrate, but not to demonstrate. Nevertheless, a great part of our philosophy hath no other foundation, than analogy, the utility of which consists in superseding all necessity of examining minutely every particular body; for it suffices us to know, that every thing is governed by general and immutable laws, in order to regulate our conduct with regard to all similar bodies, as we may reasonably believe that they all are endowed with the same properties: thus, we never doubt that the fruit of the same tree has the same taste.

It is true, reasoning by analogy may sometimes lead to error: thus, the analogy between the constellation called Leo, and the animal of that name, has given room to some astrologers to imagine, that children born under that constellation were inspired with a martial spirit.

ANALOGY, among geometricians, denotes a similitude of ratios. See *RATIO*.

ANALOGY, in medicine, the resemblance observable between different diseases, which indicates a similar treatment.

ANALOGY, among grammarians, is the correspondence which a word or phrase bears to the genius and received forms of a language.

ANALOGY of *Doctrine*, among critics, is the explaining the passage of an author, in a manner consistent with the system which he is known to have generally followed. And nearly the same sense, is

ANALOGY of *Faith*, among divines, the connection which subsists between the several articles of the Christian faith, in contradistinction from reason on the one hand, and from authority and tradition on the other. Hence, by analogy of faith, all obscure passages of scripture are to be interpreted, agreeably to the general system clearly demonstrable from holy writ.

ANALOGY, in rhetoric, a figure of speech otherwise called comparison.

ANALYSIS, in a general sense, implies the resolution of something compounded into its original and constituent parts.

ANALYSIS, among logicians, is the resolving of knowledge into original principles, by tracing things backward to their causes.

ANALYSIS, among mathematicians, the art of discovering the truth or falsehood of a proposition, or its possibility or impossibility. This is done by supposing the proposition, such as it is, true; and examining what follows from thence, until we arrive at some evident truth, or some impossibility, of which the first proposition is a necessary consequence; and from thence establish the truth or impossibility of that proposition.

ANALYSIS is divided, with regard to its object, into that of *finites*, and *infinities*.

VOL. I. No. 6.

ANALYSIS of *finite Quantities*, is what we otherwise call specious arithmetick, or algebra. See *ALGEBRA*.

ANALYSIS of *infinities*, called also the *New ANALYSIS*, is particularly used for the method of fluxions, or the differential calculus. See *FLUXIONS*.

ANALYSIS, in rhetoric, denotes the stripping a discourse of all its gaudy dress of tropes and figures; or, shewing what use the orator has made of these decorations, in order to embellish and set off every part of his oration to the best advantage.

ANALYSIS, in chymistry, implies the decomposing mixed bodies, or separating their component principles; in order to obtain each of them unmixed with the other.

The method most commonly used in the decomposition of bodies is by applying to them successive degrees of heat, from the gentlest to the most violent, in appropriated vessels, so contrived as to collect what exhales from them. By this means the principles are gradually separated from each other; the most volatile rise first, and the rest follow in order, as they come to be acted on by the proper degree of heat: and this is called distillation.

But it being observed that fire; applied to the decomposition of bodies, most commonly alters their secondary principles very sensibly, by combining them in a different manner with each other, or even partly decomposing them, and reducing them to their primitive principles; other means have been used to separate those principles without the help of fire.

With this view the mixts to be decomposed are forcibly compressed, in order to squeeze out of them all such parts of their substance as they will by this means part with; or else those mixts are for a long time triturated, either along with water which carries off all their saline and saponaceous contents, or with solvents, such as ardent spirits, capable of taking up every thing in them that is of an oily or resinous nature.

ANALYSIS of *Animal Substance*—Succulent animal substances, such as new-killed flesh, yield by expression a juice or liquid, which is no other than the phlegm, replete with all the principles of the animal body, except the earth, of which it contains but little. The hard or dry parts, such as the horns, bones, &c. yield a similar juice, by boiling them in water. These juices become thick, like a glue or jelly, when their watery parts are evaporated; and in this state they are true extracts of animal matters. These juices afford no crystals of essential salt, like those obtained from vegetables, and shew no sign either of an acid or an alkali.

Great part of the oil which is in the flesh of animals may be easily separated without the help of fire; for it lies in a manner by itself: it is commonly in a concrete form, and is called fat. This oil somewhat resembles the fat oils of vegetables; for like them that is mild, unctuous, indissoluble in spirit of wine, and is subtilized and attenuated by the action of the fire. But there is not in animals, as in vegetables, any light essential oil, which rises with the heat of boiling water; so that, properly speaking, animals contain but one sort of oil.

Few animal substances yield a perceptible acid. Ants and bees are almost the only ones from which any can be obtained; and, indeed, the quantity which they yield is very small, as the acid itself is extremely weak.

The reason is, that as animals do not draw their nourishment immediately from the earth, but feed wholly either on vegetables or on the flesh of other animals, the mineral acids, which have already undergone a great change by the union contracted between them and the oily matters of the vegetable kingdom, enter into a closer union and combination with these oily parts, while they are passing through the organs and strainers of animals, whereby their properties are destroyed, or at least so impaired that they are no longer sensible.

Animal matters yield in distillation, first a phlegm, and then, on increasing the fire, a pretty clear oil, which gradually becomes thicker, blacker, more fetid, and empyreumatick. It is accompanied with a great deal of volatile alkali; and, if the fire be raised and kept up till nothing more comes over, there will remain in the distilling vessel a coal like that of vegetables; except that when it is reduced to ashes, no fixed alkali, or at least



very little, can be obtained from them, as from the ashes of vegetables. This arises, from hence, that, as we said before, the saline principles in animals being more intimately united with the oil than it is in plants, and being consequently more attenuated and subtilized, is too volatile to enter into the combination of a fixed alkali; on the contrary, it is more disposed to join in forming a volatile alkali, which on this occasion does not rise till after the oil, and therefore must certainly be the production of the fire. It must be observed, that all we have hitherto said concerning the analysis of animal bodies must be understood of such only as have not undergone any sort of fermentation.

**ANALYSIS of Mineral Substances.**—With regard to the analyzation of mineral substances, the following experiment will be sufficient: take two ounces of native cinnabar reduced to fine powder, and mix it with six ounces of quick-lime; put the whole into an earthen retort, distil it into a basin of water, and a considerable quantity of running mercury will be found at the bottom thereof. The matter remaining behind in the retort being boiled in a lixivium of pot-ash, and the solution precipitated with alum, a fine kind of brimstone, called lac sulphuris, will be procured; which will sublime into true flours of brimstone, that may be melted, and run into a roll. This brimstone being burnt, in the common method, under a glass bell, resolves into an acid liquor, leaving an inflammable, scurfy, terrestrial matter behind; which, being treated as an ore, sometimes affords a small portion of metal, either iron or copper. From this instructive experiment, if fully explained, we might derive considerable discoveries. It shews that a true running mercury may lie concealed in metallick ores, or stony earths; for native cinnabar is but an ore of mercury, consisting, as we see, of two different matters, sulphur and quick-silver; which are separable by distillation with quick lime, or iron filings, and sometimes by long boiling in a strong alkaline lixivium.

We may further observe from the foregoing experiment, that, as common brimstone resolves itself into an acid liquor and an earthy matter, we find that certain mineral or metallick substance will, by a proper analysis, afford the four chymical principles, viz. running mercury, sulphur, salt, and earth. But it is not supposed to hold universally, that all mineral substances should afford a running mercury upon their analysis, but only such of them as are properly metallick.

So far as the analysis of metals has been carried, it should seem that all metals contain a running mercury, fixed in them, as water is fixed in dry animal or vegetable substance; and joined with a sulphur, or an inflammable part, and an earth; with a little salt in some of them. The fossil salts resolve into a large quantity of acid, which is always united with some sulphur, and a small proportion of earth. Most stones resolve into a large proportion of earth, and a small quantity of aqueous and sulphureous vapour. And earths resolve into a mere terrestrial substance, a little aqueous acid, and a small proportion of sulphur.

Upon the whole therefore we may conclude, that the five principles, water, earth, salt, sulphur or oil, and perhaps mercury, are the true chymical principles of vegetable, animal, and mineral substances. We have not here taken notice of air as a chymical principle, notwithstanding it is found in all bodies, because there is no known method of fixing it, so as to render it tangible and corporeal.

**ANALYST**, a person acquainted with the analytical method of resolving problems.

**ANALYTICKS**, among mathematicians, the doctrine of analysis or algebra.

**ANAMESTICKS**, among physicians, are the signs by which the present state of the body is discovered.

**ANAMORPHOSIS**, in perspective painting, implies a monstrous projection, or representation of an image on a plane, or curve surface, which viewed at a proper distance, will appear regular and in a due proportion.

To delineate an anamorphosis upon a plane.—— Draw the square AB, (plate I. fig. 11.) of a bigness at

pleasure, and subdivide it into a number of little squares. In this square, called the craticular prototype, let the image to be represented deformed, be drawn; then draw the line *ab* (fig. 12.) equal to AB, and divide it into the same number of equal parts 1, 2, 3, 4, 5, 6, as the side of the prototype AB; erect the perpendicular EV in the middle of *ab*, so much the longer as the deformity of the image is to be greater. Draw VS perpendicular to EV, so much the shorter as you would have the image appear more deformed. From each point of division draw straight lines to V, and join the points *b* and *S*, by the right line *bS*. Through the points *d, e, f, g*, draw right lines parallel to *ab*, then will *abcd* be the space in which the monstrous projection is to be delineated: this space is called the craticular ectype. Lastly, in every areola, or small trapezium, of the space *abcd*, draw what appears delineated in the correspondent areola of the square AB; and thus you will obtain a deformed image, which will appear in just proportion to an eye distant from it the length EV, and raised above its height VS.

An image may be deformed mechanically, if you place it, having little holes made here and there in it with a needle, against a candle, and observe where the rays going through these holes, fall on a plane or curve surface; for they will give the corresponding points of the image to be deformed.

**ANANAS**, in botany, the name of a distinct genus of plants, called in English the pine-apple, the flower of which consists of only one infundibuliform petal, divided into three segments at the edge; and its fruit is of a turbinated form, containing a number of kidney-like seeds.

The *ananas* belongs to the *hexandria-monogynia* class of Linnæus, who gives it the name of *bromelia*. See **BROMELIA**.

No fruit comes up to it, either for its delicious flavour or beautiful colour. It is propagated with us in stoves, and should be gathered and eaten as soon as ripe, which is known by its strong and agreeable smell, as well as softness.

The juice of the *ananas* makes an excellent wine, very proper to be given in a nausea, and to provoke urine: Lemery adds, that on the spot where it grows, they make a confection of it, which is brought here whole, and is good to restore a weak constitution.

**ANANCITIS**, in antiquity, a kind of figured stone, otherwise called synochites, celebrated for its magical virtue, in raising the shadows of the infernal gods.

**ANANTHOCYCLUS**, in botany, a name used by Vaillant for the colutea of other authors.

**ANAPÆST**, in ancient poetry, a foot consisting of one long syllable following two short ones: such is the word *scōpūlōs*. It is the reverse of the dactyl.

**ANAPÆSTICK Verses**, those which principally consist of anapæsts.

**ANAPHORA**, in rhetoric, the repetition of the same word or words that concluded one sentence, at the beginning of the next. It is derived from *αναφερω*, to transfer.

**ANAPHORA**, among the ancient physicians, implies the throwing off the purulent matter by the mouth.

**ANAPLASIS**, among the old surgeons, signifies the replacing a fractured bone in its original situation.

**ANAPLEROSIS**, in surgery, implies the restoring deficiencies.

**ANAPLEROTICKS**, in pharmacy, such medicines as promote the growth of flesh in wounds or ulcers, and generally called incarnatives.

**ANARCHY**, such a confusion in a state or kingdom, that no supreme authority is lodged either in the prince or other rulers, and consequently the people live at large, without any subordination or regard to law.

**ANARRHOPIA**, among physicians, a tendency of the humours towards the superior parts.

**ANARTHRA**, a class of naked insects distinguished from all others being destitute both of wings and limbs.

All worms and leeches belong to this class.

**ANASARCA**, in medicine, a species of dropsy, wherein



wherein the skin appears puffed up and swelled, and yields to the impression of the fingers like dough. See the article *Dropsy*.

**ANASTATICA**, the rose of Jerico, a genus of tetradynamious plants, the flower of which consists of four roundish petals, disposed in the form of a cross. The fruit is a short bilocular pod, containing in each pod a single roundish seed.

**ANASTOMASIS**, or **ANASTOMOSIS**, in anatomy, the opening of the mouths of vessels, in order to discharge their contained fluids.

**ANASTOMASIS**, also implies the communication of two vessels at their extremities; as an artery with a vein, &c. generally called *inosculation*.

**ANASTOMATICKS**, in pharmacy, medicines which have the power of opening the mouths of vessels, and promoting the circulation of the blood.

**ANASTROPHE**, in rhetoric and grammar, denotes the inversion of the natural order of words.

**ANATHEMA**, among ecclesiastical writers, imports whatever is set apart, separated, or devoted; but is most generally used to express the cutting off a person from the privileges of the society, and communion with the faithful.

The anathema differs from excommunication in the circumstance of being attended with curses and execrations. It was practised in the primitive church against offenders; and the form of that pronounced by Synecius against one Andronicus, is as follows: "Let no church of God be open to Andronicus, but let every sanctuary be shut against him. I admonish both private men and magistrates, neither to receive him under their roof, nor to their table, and priests more especially, that they neither converse with him living, nor attend his funeral when dead."

Several councils also have pronounced anathemas against such as they thought corrupted the purity of the faith, and their decisions have been conceived in the following manner; *Si quis dixerit, &c. anathema sit*.

There are two kinds of anathemas, the one judicary, and the other abjuratory. The former can only be denounced by a council, a pope, or a bishop; the latter makes a part of the ceremony of abjuration, the convert being obliged to anathematize the heresy he abjures.

**ANATHEMA**, in heathen antiquity, was an offering or present made to some deity, so called from its being hung up in the temple.

Whenever a person left off his employment, it was usual to dedicate the tools to the patron deity of such a trade. Persons too who had escaped some imminent danger, as shipwreck and the like, or had met with any other remarkable instance of good fortune, seldom failed to testify their gratitude by some present of this kind.

**ANATOCISM**, in antiquity, an usurious interest paid for the loan of money. The moderns call it compound interest, and arises from the interest being left in the borrower's hands, and every year added to the principal, whereby a new principal is constantly acquired, and the interest continually increases with such augmentation.

**ANATOMICAL**, something belonging to anatomy.

**ANATOMY**, the art of dissecting the solid parts of an animal body, in order to discover its structure and the various uses of its component parts.

It is not very certain at what period anatomy began to be cultivated as a science; but it is believed, that a general knowledge of the structure of the parts prevailed in very early ages of the world. Nevertheless the ancients did not make any remarkable progress in anatomy; and this art was neglected when the rays of learning began to spread their influence over Europe, till Dr. Harvey published his discovery of the circulation of the blood in 1628, from which time anatomy made a surprising progress; and a multitude of writers on that science appeared: and it would have been fortunate for anatomy, and students in this science, if authors could have been satisfied with publishing their own discoveries, and animadverting on the errors of others; but, instead of this, many have thought that a discovery, sometimes trifling enough, or a professor's

chair, have entitled them to write an entire system; and by that means rendered it necessary to search large volumes for discoveries, which a few pages were sufficient to contain. Clopton Havers, an English physician, wrote admirably on the bones, and made some considerable discoveries with respect to the periosteum and the marrow. He discovered in every joint particular glands, out of which issued a mucilaginous substance, whose nature he examined by several experiments; which, with the marrow supplied by the bones, constantly oil the joints, that both they and the muscles might answer those ends of motion for which nature designed them. This was a very useful discovery; since it has rendered abundance of things, before obscure in that part of anatomy, plain and easy to be understood.

Dr. Willis, another English physician, was an excellent anatomist, particularly in what relates to the brain, nerves, stomach, and intestines. Piccolomini had, before him, observed that the brain, properly so called, and the cerebellum, consist of two distinct substances, an outer ash-coloured substance, through which the blood vessels which lie under the pia mater in innumerable foldings and windings are disseminated; and an inner, every where united to it, of a nervous nature, that joins this substance to the medulla oblongata, which is the original of all the pairs of nerves that issue from the brain, and of the spinal marrow, that lies under the brain and cerebellum. Dr. Willis greatly improved these discoveries; he was so exact, that he traced this medullary substance through all its insertions; examined the progress of all the nerves to every part of the body. Hence he not only demonstrably proved the brain to be the fountain of sense and motion; but also, by the course of the nerves, the manner how every part of the body conspires with others to procure any particular motion, was clearly explained.

Pequet discovered the receptacle of the chyle, and shewed, beyond contradiction, that the lacteal vessels convey the chyle to this receptacle, and proved that it is thence carried by particular vessels through the thorax, into the left subclavian vein, and so directly to the heart.

Alphonfus Borellus gave a mechanical account of the motion of animals, drawn from the structure of the parts. As he had the advantage of Dr. Lower's discoveries, with respect to the order of the muscular fibres of the heart, he was enabled to give a solution of all the appearances of the motions of the heart, and of the blood in the arteries, upon mathematical and mechanical principles. Marcellus Malpighius was deservedly celebrated for his great skill and singular anatomical researches. His industry was not confined to the more perfect animals, but was extended to insects, and even to vegetables, to the great improvement of natural knowledge and his own honour. He discovered, by means of his own microscopes, the texture of the brain, tongue, lungs, liver, and spleen; the mechanism of the reins was wholly unknown till Malpighius found it out; and by that means effectually confuted several notions, before entertained, of some secondary uses of these parts, by proving that every part of the kidneys is immediately and wholly subservient to that single operation of freeing the blood from its superfluous serum and salts. He also made some new and curious observations on the lymphatick vessels and glands.

Frederick Ruysch greatly contributed to the improvement of anatomy. This gentleman, from his infancy, devoted himself to physick, and began his first researches with the materia medica. The virtue of plants, the structures of animals, the qualities of mineral bodies, chymical operations, and anatomical dissections, were the objects that first struck his fancy, and called for his improving hand. He was none of those superficial inquirers, who, either through prejudice or indolence, rest satisfied before they have attained the truth: for he had stripped his mind of all those unreasonable attachments which are inconsistent with the temper of a philosopher; and acquired such an indefatigable turn, that the hardest labours in the pursuit



fruit of truth became his highest pleasures and his only recreations.

Swammerdam, having discovered a method of injecting the vessels with a certain matter, communicated his discovery to Ruysch, who greatly improved it; and discovered a multitude of things before unknown.

Leuwenhoek obliged the world with a great number of discoveries relative to anatomy, by means of his microscopes; particularly the anastomoses of the arteries and veins. Several other ingenious anatomists followed him, and carried the science to a great degree of perfection.

*Comparative ANATOMY*, that which is employed in examining the bodies of brutes.

*ANATOMY* is used by some writers to denote the subject anatomized. See the article *SKELETON*.

*ANATOMY of Plants*. See the article *PLANT*.

*ANATRON*, or *NATRON*. See the article *NATRON*.

*ANAXIMANDRIANS*, in the history of philosophy, the followers of Anaximander; the most ancient of the philosophical atheists, who admitted of no other substance in nature but matter.

*ANBURY*, or *AMBURY*, among farriers, a kind of spongy wort or wen full of blood, growing upon any part of a horse.

*ANCESTORS*, those from whom a person is descended in a straight line.

*ANCESTREL*, in law, something that relates to, or has been done by one's ancestors.

*ANCHILOPS*, in medicine, a small tumour in the great angle of the eye, frequently degenerating into an abscess, or fistula lacrymalis.

*ANCHOR*, amongst seamen, a strong, heavy instrument of iron, sunk from a ship to moor or retain her in a road, bay, or harbour.

An anchor is artfully calculated by the construction of its parts, both to sink into the ground when it reaches the bottom, and to bear a very great strain before it can be drawn from thence by the weight of the ship; and, indeed, very seldom loses its hold, but in bad ground, (see the next article) so that the cable, or rope, fastened to it generally breaks before the anchor gives way. It is composed of a shank or shaft, two arms, two flukes, a stock, and a ring.

That the form of so very useful an instrument may be more clearly understood; let us suppose a round, massy beam of iron, standing upright; at the lower end of which are two arms pointing north and south, nearly of the same thickness with the shank, but tapering a little near the points, which are elevated above the horizontal plane about thirty degrees, or inclined to the shaft at an angle of sixty degrees. On the upper part of each arm is a fluke, i. e. a strong thick plate of iron, in form of an isosceles triangle, the base of which reaches into the middle of the arm. At the upper end of the shaft is fixed the stock, which is a long, square beam of oak, in two parts, bolted together, the ends of which point east and west. Close above the stock is the ring to which the cable is bent or fastened; the ring is curiously covered with a number of pieces of rope, equal in length to its circumference, which are firmly fastened round it to preserve the cable from being fretted or chafed by the iron.

Every ship has or ought to have three principal anchors, with a cable to each, viz. the sheet, the best-bower, and small bower; there are, besides, smaller anchors for transporting or removing a ship from place to place in a harbour or river, where there may not be room or wind for sailing; such as the stream anchor, the kedge and grapling, which last is however generally used for the boats.

To illustrate the foregoing description, we have added a perspective view of an anchor (*plate I. fig. 13.*) where *a* is the ring to which the cable is fastened, *b c* the beam or shank, *d e* the arm, or that which runs into the ground, *e f* the fluke or palm, and *g h* the stock.

*ANCHOR-GROUND* is such as is neither too deep, rocky, nor too shallow, as, in the first, the cable bears

too nearly perpendicular, and is thereby apt to jirk the anchor from the ground; in the second, the anchor is liable to hook the broken ends of rocks, and tear away the flukes, and the cable is ever in danger of being cut through by their edges; and in the third, the ship's bottom is apt to strike in a high sea, or at low water. An anchor is said to come home when the violence of the wind or tide, acting upon the ship, makes her tear it up from the bed into which it had sunk, and drag it along the ground. An anchor is said to be foul when it either hooks some other anchor, wreck, or cable, under water; or when, by the wind abating suddenly she slackens her strain and sweeps round her anchor, taking a hitch or turn round one of the flukes with the slack cable, which must of necessity drag it out of the ground when the cable becomes tight: the anchor is then likewise said to come home.

*ANCHOR*, in architecture, a sort of carving resembling an anchor. It is commonly placed as part of the enrichments of the bouldins of Tuscan, Doric, and Ionic capitals, and also of the bouldins of the Doric, Ionic, and Corinthian cornices; anchors and eggs being carved alternately through the whole building.

*ANCHOR*, in heraldry, is used as an emblem of hope.

*ANCHORAGE*, in law, implies a duty taken of ships for the use of the port or harbour where they come to an anchor.

*ANCHOVY*, in ichthyology and commerce, a species of clupea, with the upper jaw longest. The anchovy is so like the common sprat, another species of clupea, that it is no wonder this fish is often pickled and sold under its name.

*ANCHUSA*, *Alkanet*, in botany, a species of bugloss, with a rough hairy perennial plant, and unbranched procumbent stalks, differing chiefly from the common buglosses in the red colour of its roots. It grows wild about Montpellier and the eastern countries, and is cultivated in some of our gardens; but the roots produced in this climate are paler coloured than those we receive from abroad.

The roots of anchusa, when in perfection, are externally of a deep purplish red colour. The red cortical part, separated from the whitish woody pith, imparts a fine deep red colour to oils, wax, and all unctuous substances, and to rectified spirit of wine. To water it gives only a dull brownish hue. The spirituous tincture, on being inspissated to the consistence of an extract, changes its fine red to a dark brown. Alkanet root has little or no smell, and scarcely any taste; it is now used as a medicine; but its chief use is in colouring oils, plaisters, lip-salves, &c. which receive a fine deep red from one fortieth of their weight of the root.

*ANCHYLAS*. See *ANCHILOPS*.

*ANCIENT*, or *ANTIEN*, something old, or that existed in former ages.

*ANCON*, *ανκων*, in anatomy, the gibbous eminence, or flexure of the cubit, the middle of the eminence on which we lean, being the greatest of the two apophyses of the ulna, and the same with the olecranon.

*ANCONÆUS*, in anatomy, the sixth muscle of the elbow. See *MUSCLE*.

*ANCONES*, in architecture, the corners, or coins of walls, cross-beams, or rafters.

*ANCONY*, in minerology, denotes a bloom of iron fashioned into a flat bar, about three feet long, with a square rough knot at each end.

*ANCREE*, or *ANKERD*, in heraldry. A cross *incree* or *anchored*, is a form of cross, so called, because the four extremities of which resemble the flukes of an anchor.

*ANCYLE*, or *ANCYLOSIS*, in surgery, a distortion, or fixation of the joints caused by a settlement of the humours, or a distention of the nerves; and therefore remedies of a mollifying and relaxing nature are required.

*ANCYLE*, in antiquity, a kind of shield which fell, as was pretended from heaven, in the reign of Numa Pompilius. At which time, likewise, a voice was heard,



heard, declaring that Rome should be mistress of the world as long as she should preserve this holy buckler. It was therefore kept, with great care, in the temple of Mars, under the direction of twelve priests, and least any should attempt to steal it, eleven others were made so like as not to be distinguished from the sacred one. These ancylia were carried in procession every year round the city of Rome.

ANCYLOGLOSSUM, among physicians, denotes a contraction of the ligaments of the tongue, hindering speech.

ANCYLOMELE, a surgeon's crooked probe.

ANCYLOSIS, in surgery. See ANCYLE.

ANCYROIDES, among anatomists. See CORACOIDES.

ANDANTI, in musick, signifies, especially in thorough-basses, that the notes are to be played distinctly.

St. ANDREW, or the *Thistle*, a military order of knighthood in Scotland.

The occasion of instituting this order of the Thistle in Scotland is variously related by different authors. John Lesley, bishop of Ross, reports, that the night before the battle betwixt Athelstane king of England, or rather of Northumberland, and Hungus king of the Picts, a bright cross, in the fashion of that whereon St. Andrew suffered martyrdom, appeared in the air to Hungus; who, having gained the victory, bore the figure of that cross at all times after in his ensigns and banners, from which time all succeeding kings of Scotland have religiously observed the same bearing.

—Others assert, that this extraordinary appearance was not to Hungus, but to the Scots, whom Achaius king of Scotland, sent to his assistance. This victory is said to be obtained in the year 819 (though, according to Buchanan, Achaius died nine years before) and that Hungus and Achaius went bare-footed in solemn procession to the kirk of St. Andrew, to return thanks to God and his apostle, promising that they and their posterity would ever use in their ensigns the cross of St. Andrew; which custom prevailed among the Picts, and continues among the Scots to this day: and that both these kings instituted an order, which they named the order of St. Andrew.

Others, who allow that Achaius instituted this order, give the following account of its origin: Achaius having made that famous league, offensive and defensive, with Charlemaigne, against all other princes, found himself thereby so strong, that he took for his device the *Thistle* and the *Rue*, which he composed into a collar of his order, and for his motto, *Pour ma defence*; intimating thereby, that he feared not the powers of foreign princes, seeing he leaned on the succour and alliance of the French.—And though from hence may be inferred, that these two plants, the Thistle and the Rue were the united symbols of one order of knighthood; yet Menenius divides them into two, making one whose chief badge was the Thistle, whence the knights were so called, and the motto, *Nemo me impune lacessit*; another vulgarly called *Sertum rutæ*, or the garland of rue; the collar of which was composed of two branches or sprigs thereof, or else of several of its leaves; however, at both these collars hung one and the same jewel, to wit, the figure of St. Andrew, bearing before him the cross of his martyrdom.

But though the Thistle has been acknowledged for the badge and symbol of the kingdom of Scotland, even from the reign of Achaius, as the rose was of England, the lily of France, the pomegranate of Spain, &c. yet there are some who refer the order of the Thistle to later times, in the reign of Charles VII. of France, when the league of amity was renewed between that kingdom and Scotland, by which the former received great succour from the latter, in a time of extraordinary distress. Others place the foundation still later, even as low as the year 1500.

The chief and principal ensign of this order is a gold collar, composed of thistles, interlinked with annulets of gold, having pendant thereunto the image

of St. Andrew with his cross, and this motto, *Nemo me impune lacessit*.

*Knights of St. ANDREW* is also an order instituted by Peter the Great of Muscovy, in 1698; the badge of which is, a golden medal, on one side whereof is represented St. Andrew's cross, and on the other are these words; *Czar Pierre monarque de toute la Russie*.

This medal, being fastened to a blue ribbon, is suspended from the right shoulder.

St. ANDREW'S-DAY, a festival of the christian church, celebrated on the 30th of November, in honour of the apostle St. Andrew.

ANDRIA, in Grecian antiquity, publick entertainments first instituted by Minos of Crete, and, after his example, appointed by Lycurgus at Sparta, at which a whole city, or a tribe assisted. They were managed with the utmost frugality, and persons of all ages were admitted, the younger sort being obliged by the law-giver, to repair thither as to schools of temperance and sobriety.

ANDROGYNOUS, in zoology, an appellation given to animals, which have both the male and female sex in the same individual.

ANDROIDES, in mechanicks, a human figure, which by means of springs, performs several of the external functions of a man.

ANDROLEPSY, in Grecian antiquity, an action allowed by the Athenians, against such as protected persons guilty of murder. The relations of the deceased were empowered to seize three men in the city or house, whither the malefactor had fled, till he were either surrendered, or satisfaction made some other way for the murder.

ANDROMEDA, in astronomy, the name of a constellation of the northern hemisphere, representing a woman chained to a rock. The number of stars in this constellation, in Ptolemy's catalogue are 23; in Tycho's 22; in Bayer's 27; and in Mr. Flamsteed's 66.

ANDROMEDA, in botany, is a name given by Linnæus to the *chamærhododendros* of Tournefort.

ANDROSACE, in botany, a distinct genus of plants; the flower of which consists of one saucer-like petal, very wide at the mouth, and divided into five segments; and its fruit is a globose, unilocular capsule, containing a number of small oval or roundish seeds, affixed to a placenta.

ANDROSÆMUM, TUTSAN, in botany, constitutes a distinct genus of plants, according to Tournefort, but is comprehended by Linnæus among the *hypericum*s.

ANDROTOMY, or ANDRAOTOMY, the dissection of a human body, in contradistinction to zootomy, or the dissection of brutes.

ANECDOTE, in matters of literature, some fact relating to history, not formerly published to the world, or generally known.

The word is Greek, *ανεκδοτῶν*, and compounded of *α*, priv. and *εκδοτῶν*, published.

ANEE, in commerce, a measure for grain, used in some provinces of France. At Lyons, it signifies also a certain quantity of wine, which is the load an ass can carry at once: which load is fixed at eighty English quarts wine measure.

ANEMUS, among chymists, implies a wind-furnace used for fluxing metals, and other operations where a very strong fire is necessary.

ANEMOMETER, in mechanicks, implies a machine for measuring the force or velocity of the wind.

The word is formed from the Greek, *ανεμῶν*, the wind, and *μετρεῖν*, to measure.

Various machines of this kind have been invented at different times, and by different authors. The following has been often experienced, and found to answer the intention.

An open frame of wood ABCDEFGHI, (see plate II. fig. 8.) is supported by the shaft or arbor I. In the two cross pieces HK, LM, is moved a horizontal axis QM, by means of the four sails *ab*, *cm*, *Of*, *gh*, exposed to the wind in a proper manner. Upon this



axis is fixed a cone of wood MNO; upon which, as the fails move round, a weight R, or S, is raised by a string round its superficies, proceeding from the smaller to the larger end NO. Upon this larger end or base of the cone, is fixed a rocket-wheel *k*, in whose teeth the click X falls, to prevent any retrograde motion from the depending weight.

The structure of this machine sufficiently shews that it may be accommodated to estimate the variable force of the wind; because the force of the weight will continually increase, as the string advances on the conical surface, by acting at a greater distance from the axis of its motion: consequently, if such a weight be added on the smaller part M, as will just keep the machine in equilibrio in the weakest wind, the weight to be raised as the wind becomes stronger, will be increased in proportion; and the diameter of the cone NO may be so large, in comparison to that of the smaller end at M, that the strongest wind shall but just raise the weight at the greater end.

If, for example, the diameter of the axis be to that of the base of the cone NO, as 1 to 28; then, if S be a weight of one pound at M on the axis, it will be equivalent to 28 pounds when raised to the greater end: if therefore, when the wind is weakest, it supports one pound on the axis, it must be 28 times as strong to raise the weight to the base of the cone. If therefore a line or scale of 28 equal parts be drawn on the side of the cone, the strength of the wind will be indicated by that number on which the string rests.

ANEMONIE, the wind-flower, in botany, a genus of polyandrious plants: the flower consists of two or three orders of petals, which are oblong, and disposed in three series over each other; the filaments are capillary and numerous, topped with double upright antheræ; the germina are many, and collected in the head of the flower, each crowned with an obtuse stigma. It is destitute both of calix and pericarpium, but the receptacle is globose or oblong, attenuated and punctuated, and produces numerous and acuminate seeds, inclosed with a down, having the styles affixed to them. There are two sorts of species in this genus, the cultivated and the wild. Those that are raised in gardens, produce a fine variety of beautiful flowers, which blossom in April: the root is tuberous and irregular, of a darkish brown on the outside, whitish within, and hung with many thick fibres, dividing itself in time into numerous heads. The leaves, supported by footstalks, arise from the root, and are divided into a number of segments, and these are again subdivided into others: the flower stalk is round, and tolerably upright; it is not divided or branched, and is bare of leaves, except at one place is situated a foliaceous involucre, which is divided at the leaf, and on the summit of the stalk is placed the single flower. These flowers have of late years been cultivated, with care, and as they are very beautiful, deserve a place in every curious garden.

ANEMOSCOPE, according to Vitruvius's description, a machine shewing from what point of the compass the wind blows. Such is that in one of the turrets of the Queen's palace in London.

This is done by means of an index moving about an upright circular plate, the index being turned by an horizontal axis, and the axis by an upright staff, at the top of which is the vane moved about by the wind.

ANEMOSCOPE, denotes also an instrument invented to foretel the changes of the wind. Otto Guericke gave this name to a machine he invented, consisting of a little wooden man, which by rising and falling in a glass tube, shewed the change of the weather. But it has been discovered, that this was only an application of the common barometer.

The late ingenious Mr. Pickering published in the Philosophical Transactions, Numb. 473, an instrument which he called an anemoscope, calculated to shew both the velocity of the wind, and the point of the compass on which it blows. We have given a perspective view of this instrument in plate II. fig. 5.

This anemoscope is a machine four feet and a quarter high, consisting of a broad and weighty pedestal, a pillar fastened into it, and an iron axis, of about half an inch diameter, fastened into the pillar. Upon this axis turns a wooden tube, at the top of which is placed a vane, of the same materials, 21 inches long, consisting of a quadrant, graduated and shod with an iron rim; notched to each degree; and a counterpoise of wood, as in the figure, on the other. Through the centre of the quadrant runs an iron pin, upon which are fastened two small round pieces of wood, which serve as moveable radii to describe the degrees upon the quadrant, and as handles to a velum or fail, whose plane is one foot square, made of canvas, stretched upon four battens, and painted. On the upper batten, next to the shod rim of the quadrant, is a small spring, which catches at every notch corresponding to each degree, as the wind shall, by pressing against the fail, raise it up; and prevents the falling back of the fail, upon lessening of the force of the wind. At the bottom of the wooden tube is an iron index, which moves round a circular piece of wood fastened to the top of the pillar on the pedestal, on which are described the thirty-two points of the compass. The figure of this machine may be seen, (plate II. fig. 5.) where *a* is the pedestal; *b*, the pillar in which the iron axis is fitted; *c*, the circle of wood, on which are described the 32 points of the compass; *e*, the wooden tube upon its axis; *f*, the velum; *g*, the graduated quadrant; *k*, the counterpoise of the vane.

Fig. 6. The velum takes off: *a*, the plane of the velum; *b*, the spring; *c, c*, the wooden radii; *d, d*, the holes through which the pin in the centre of the quadrant goes. Its uses are the following:

1. Having a circular motion round the iron axis, and being furnished with a vane at top, and index at the bottom, when once you have fixed the artificial cardinal points, described on the round piece of wood on the pillar, to the same quarters of the heavens, it gives a faithful account of that quarter from which the wind blows.

2. By having a velum or fail elevated by the wind along the arch of the quadrant, to an height proportionable to the power of the column of wind pressing against it, the relative force of the wind, and its comparative power, at any two times of examination may accurately be taken.

3. By having a spring fitted to the notches of the iron with which the quadrant is shod, the velum is prevented from returning back upon the fall of the wind; and the machine gives the force to the highest blast, since the last time of examination, without the trouble of watching it.

The ingenious contriver of this machine tells us, that he carefully examined what dependence may be had upon it, during the storms of February, 1743-4, and found that it answered exceeding well; for that, in such winds as the sailors call violent storms, the machine had six degrees to spare for a more violent gust, before it comes to a horizontal position.

It is certainly to be depended upon in ordinary weather, the velum being hung so tenderly as to feel the most gentle breeze. There is however reason to fear, that the exposing the anemoscope to all winds for a continuance, must disorder it, especially irregular blasts and squalls. It may not therefore be amiss, in violent weather, for the observer to take the tube with its vane and velum in his hand, in order to know the force of the wind; and, when he has finished his observations, to carry the machine into the house, till the violence of the storm is abated, when it may be replaced in its former situation.

ANETHUM, *Dill*, in botany, an annual unbeflowered plant, with very finely divided leaves, and yellow flower; producing pale yellowish oval seeds flattened on one side, marked with three longitudinal striæ on the other, and the edges surrounded with a leafy margin. It is a native of the warmer climates, cultivated with us in gardens, flowers in July, and in September sheds its seeds, by which the plant is plentifully propagated.

The



The distilled water, drawn off to the quantity of a gallon from a pound of the seeds, is kept in the shops, and occasionally made the basis of carminative draughts and juleps.

**ANEURISM**, or **ANEURYSM**, in surgery, a throbbing tumour, distended with blood, and formed by a dilatation or rupture of an artery. Surgeons usually distinguish two kinds, the true and spurious.

The cure of aneurisms differs according to their kind. A small one of the true species may be removed by deligation; that is, by a compress and bandage, or by an instrument adapted for that purpose. But if that method should not succeed, recourse must be had in this, as in large and spurious aneurisms, to incision.

**ANGEIOGRAPHY**, or **ANGEIOLOGY**, among anatomists, implies a description and history of the several vessels of the human body.

**ANGEIOTOMY**, in surgery, implies the opening any of the vessels of the human body.

**ANGEL**, a name given to those spiritual intelligent beings, who are supposed to execute the will of the Divine Being in the government of the world.

The word is Greek, *αγγελος*, and derived from *αγγελλω*, to carry a message, or execute an order.

All religions have admitted of the existence of angels. The Greeks and Latins acknowledged them under the names of genii and demons; and in the Alcoran we find frequent mention of them; the professors of the Mahometan religion assigning them various orders and degrees, as well as different employments, both in heaven and earth.

Nothing is more frequent in Scripture than the missions and apparitions of good and bad angels: God sends them to declare his will, to correct, teach, reprove, and comfort: God gave the law to Moses, and appeared to the old patriarchs by the mediation of angels, who represented him and spoke in his name. The existence of angels is supposed in all religions.

It is impossible for us to know any thing certain of the nature of angels; but we may believe, that though of an order highly superior to that of men, they are not complete and perfect: for if they had been created thus originally, they could not have sinned; which the holy Scriptures inform us some of them did, in rebelling against the Almighty. For this reason, as they are themselves imperfect beings, they cannot properly be the objects of our adoration; which should be paid alone to that **ONE SUPREME**, who is omnipotent, immortal, infinite, the source and centre of every thing that is great, and good, and perfect.

**ANGEL**, in commerce, the name of a gold coin formerly current in England. It has its name from the figure of an angel represented upon it, weighed four pennyweights, and was twenty-three and a half carats fine. It had different values in different reigns; but is at present only an imaginary sum, or money of account, implying ten shillings.

**ANGELICK**, or **ANGELICAL**, in a general sense, an epithet given to whatever belongs to, or partakes of the nature of angels. See **ANGEL**.

**ANGELICK**, is also a denomination figuratively given to several things, on account of their superior excellence. Thus we read of an angelical life, angelical poems, angelical pills, &c.

**ANGELICA**, in botany, a large umbelliferous plant, with hollow jointed stalks, and indented oval, pointed leaves, set in pairs along the middle rib, and having an odd one at the end, containing a milky juice, which on drying contracts a yellowish colour; the ribs of the leaves are channelled on the upper side, and joined to the stalks by large membranaceous bases or sheaths. The seeds are of a pale-whitish colour, somewhat oval, flat on one side, and convex, with three longitudinal ridges on the other, surrounded about the edges with a leafy margin. The roots are long and thick, of a dark brown colour on the surface, but the internal white and juicy; and, when dry, of a spongy texture.

There are two species of angelica, the wild and the garden, distinguished by the epithets *sylvestris* and *sativa*. The former grows wild, in moist grounds, in several

parts of England; is perennial, and flowers in July: the latter is cultivated in gardens. They are similar in quality; but the latter is supposed to be the stronger.

The garden angelica is naturally a biennial plant; but if the stalks are cut down before they run to flower, the roots will send forth new heads, and may by this means be continued for many years. The roots are in their greatest perfection in the second spring: they should be thoroughly dried, kept in a dry place, and frequently aired, otherwise they will grow mouldy, and be eaten by worms.

The stalks candied with sugar, make a very agreeable sweetmeat.

**ÆGELICA**, in Grecian antiquity, a celebrated dance performed at their feasts; so called, because the dancers were dressed in the habit of messengers.

**ANGELICKS**, in church history, an ancient sect of hereticks, supposed by some to have got this appellation from their excessive veneration of angels, and by others from their maintaining that the world was created by angels.

**ANGELICKS**, is also the name of an order of knights, instituted in 1191, by Angelus Flavius Comnenus, emperor of Constantinople. Some will have this order, which still subsists in Italy, to have been much more ancient, making Constantine its founder.

**ANGELICKS**, is also a congregation of nuns, founded at Milan in 1534, by Louisa Torelli, countess of Gunstalla. They observe the rule of St. Augustine.

**ANGELITES**, in church history, an ancient sect of hereticks, whose distinguished tenet was, that the persons of the Trinity have no distinct subsistence, but partake in common of the same divine essence.

**ANGELOT**, a gold coin struck at Paris, while subject to the English; so called from the representation of an angel supporting the arms of England and France.

**ANGER**, a violent desire of the mind to take vengeance on the author of some real or supposed injury.

**ANGERONALIA**, in antiquity, feasts celebrated at Rome in honour of Angerona, the goddess of silence and patience.

**ANGINA**, in physick, a violent inflammation of the throat, usually called a quincy. See the article **QUINCY**.

**ANGIOSPERMA**, in the Linnæan system of botany, implies those plants of the didynamia class, which have their seeds inclosed in a capsule or seed vessel.

**ANGLE**, in geometry, the inclination of two lines meeting one another in a point.

Thus if the line CB (*plate VII. fig. 7.*) meet the line DB, in the point B, their inclination towards each other is called an angle, sometimes denotes an angle.

A single letter placed at the point of intersection; as the angle B (*fig. 18.*) imports the angles formed by the lines AB, CB, at the point B. But when several lines meet at the same point, as at B (*fig. 6.*) each particular angle is denoted by three letters, whereof the middle letter shews the angular point, and the other two letters the lines which form that angle. Thus the angle formed by the lines, AB, CB, at the point B, is called the angle ABC, or CBA.

The measure of an angle is the arch of a circle, described on the angular point, intercepted between the two lines which form the angle. Thus the measure of the angle ABC (*fig. 6.*) is the dotted arch intercepted between the two legs AB, CB; and as many degrees, &c. as are contained in that arch, so many degrees, &c. the angle ABC is said to consist of.

Hence it will be easy to measure the quantity of any angle geometrically; for if you take the distance of the arch intercepted between the lines AB, CB, and apply it to a line of chords, whose radius is BE, you will have the number of degrees, &c. contained in the angle ABC. Or, if you apply the centre of a protractor to the angular point B, in such a manner that the leg AB lies directly under the limb of the protractor, the degree on the arch cut by the other leg BC will give the quantity of the angle required.

**ANGLES** are either *right*, *acute*, or *obtuse*.

A **Right ANGLE**, is that whose two legs are perpendicular to each other; and consequently the arch intercepted



cepted between them is exactly  $90^\circ$ .—Thus the angle ABC, (fig. 18.) is a right angle.

An *Acute* ANGLE, is that which is less than a right angle, or  $90^\circ$ . as the angle CBD, (fig. 7.)

An *Obtuse* ANGLE, is that which is greater than a right angle; as ABC, (fig. 7.)

*Adjacent* ANGLES, are such as have the same vertex, and one common side continued beyond the angular point. Thus the angles CBD, and CBA (fig. 7.) are adjacent angles. The sum of these adjacent angles is always equal to two right angles (13. *Eucl.* 1.) and therefore, if one of them be acute, the other will be obtuse, and the contrary. Whence if either of them be given, the other is also given, it being the complement of the former to  $180^\circ$ .

*Vertical* ANGLES, are the opposite angles made by two lines cutting or crossing each other. Thus if the right lines AB, CD, (fig. 8.) cut or cross each other in the point E, then the angles AEC, DEB, and AED, CEB, are vertical angles.

When two lines cut or cross each other, the vertical angles are equal (15. *Eucl.* 1.)

*Alternate* ANGLES, are those cut or obtuse angles which are opposite to each other, and formed by a right-line cutting or crossing two parallel lines.—Thus if AB (fig. 16.) be parallel to CD, and the line GH cuts them in I and K, then are the angles AIK, DKI, and BIK, ICK alternate angles.

These alternate angles are always equal to each other (18. *Eucl.* 1.)

ANGLE of the *Centre of a Circle*, is an angle whose vertex or angular point is at the centre of the circle, and whose legs are two radii, or semi-diameters of that circle.

ANGLE at the *Periphery, or of a Segment*, is an angle which a chord-line makes with a tangent at the point of contact. Thus if the right-line AB (fig. 17.) touch the circle in C, then, if a chord DC be drawn, the angle ACD is an angle at the periphery, or of a segment.

This angle is equal to half the arch CD, being equal to DEC, (31. *Eucl.* 3.)

ANGLE in a *Segment*, is that formed by two chords of a circle, at its periphery.—Thus in the circle AB CD (fig. 20.) If two chords AB and BC form an angle B at the periphery, it is called an angle at the periphery.

The angle is always equal to half the angle AEC at the centre standing upon the same arch (6. *Eucl.* 3.) Also all angles in a segment, standing on the same arch, are equal to one another. Thus the angles ABC, AGC, AFC, are equal (21. *Eucl.* 3.)

When the arch is a semi-circle, the angle will be a right angle. Thus, if the arch ABC (fig. 2.) be a semi-circle, the angle ABC will be a right angle. When it is greater than a semi-circle, as (fig. 3.) the angle will be acute; but when less, as (fig. 4.) it will be obtuse (31. *Eucl.* 3.)

ANGLE of *Contact*, is that formed by a tangent and its curve at the point of contact.—Thus, if the right-line AB (fig. 10.) touch the circle FDHC, in the point D, the angle ADF is an angle of contact.

Euclid has demonstrated that the angle of contact in a circle is less than any given right-lined angle. (*Prop.* 16. *Lib.* 3.) And hence Dr. Wallis, Peletarius, &c. will have it to be no angle at all. However, angles of contact are true angles, and may be compared to one another, though they cannot be compared to right-lined angles, as being infinitely smaller than these; for the circular angles ADF, ADG, (fig. 10.) of contact are to each other in the subduplicate ratio of the diameters of those circles. And if, instead of circles, the curves had been parabolas, and the point of contact D, the vertex of their axes; the angles of contact would have been then reciprocally in the subduplicate ratio of their parameters. Whence it follows, that a circular angle of contact may be divided into any number of equal parts by circular arches, or in a given ratio.

*Spherical* ANGLE, is an angle formed by the intersection of two great circles of the sphere. Thus let ACDE (fig. 15.) represent a sphere, upon whose sur-

face let two arches of great circles AB, CE, be drawn intersecting each other in the point D; then will ADC, DCA, BDE, or DBE, be a spherical angle.

All spherical angles are measured by an arch of a great circle described on the vertex as a pole, and intercepted between the legs which form the angle.—Thus AC is the measure of the spherical angle ADC, which is equal to the distance between the poles of the circles AB, CE.

*Mixed-lined* ANGLE, is that comprehended between a right-line and a curved-line; as the angle ABC, (fig. 11.)

*Curved-line* ANGLE, is that intercepted between two curved lines meeting each other in one point, in the same plane; as the angle BCA (fig. 19.) which is intercepted between the two curved lines AC and BC.

If the right-lines DC, EC, are equal to the radii of the curves BC and AC, the right-lined angle DCE will be equal to the curved-line angle ACB. For, because the angle DCB = ECA, therefore, if from each be taken the common angle DCA, there will remain the angle DCE = ACB.

ANGLE of *incidence* is that which the line of direction of a ray of light, &c. makes at the point where it first touches the body it strikes against, with a line erected perpendicular to the surface of that body.—Thus if a ray of light, &c. move in the direction AB (fig. 6.) till it touch the surface *abcd*, in the point B, then will the angle intercepted between AB, the line of direction, and the perpendicular BF, be the angle of incidence.

ANGLE of *reflection*, is the angle intercepted between the line of direction of a body rebounding, after it was struck against another body, and a perpendicular erected at the point of contact.—Thus if a body moving in the direction AB strike the surface *abcd* in the point B, and is reflected in the direction BC, the angle, contained between that line and the perpendicular BF, is called the angle of reflection.

The angle of incidence is always equal to the angle of reflection; and upon this equality the whole science of catoptricks is founded.

ANGLE of *emergence*, is that which any body, as a ray of light, &c. projected from one fluid or medium into another, makes with its quitting the latter medium with a perpendicular to its surface.—Thus let AB and CD (fig. 13.) be parallel planes terminating water or glass, and supposing a body projected in the direction FE, entering this medium at E, and going out of it at G, in the direction GH or GM. Let GK be perpendicular to AB, CD, then the angle GKH, or GKM, is an angle of emergence. The sine of the angle of emergence, when the projected body passes quite through the medium, is to that of incidence, in a constant ratio. But when the projected body flies back out of the medium, the same way it entered in, without passing through, then the angle of incidence will always be equal to the angle of emergence. See the demonstration of these useful and fundamental propositions in Dr. Barrow's *Lectiones Opticæ*, or in Sir Isaac Newton's *Princip.* Sect. 14. Lib. 1.

ANGLE of *refraction*, in dioptricks, is the angle which a ray of light refracted makes with a ray of incidence, continued beyond the refracted surface.—Thus let DE (fig. 9.) be the refracting surface, MN a ray of incidence, and NF the refracted ray. Also let NH be the continuation of the ray of incidence, then is FNH the angle of refraction.

*Refracted* ANGLE, is the angle which a refracted ray forms with a perpendicular to the refracting surface.—Thus let GN be perpendicular to the refracting surface DE, then is GNF the refracted angle.

The sine of the angle of incidence will always have the same ratio to the sine of the refracted angle; and if this refraction be from air into glass, it will be as 31 to 20. See Sir Isaac Newton's *Opticks*, and Huygen's *Dioptricks*, p. 5.

The following easy method will suffice to shew the quantity, or law of refraction. As the refraction from air to glass is chiefly wanted in dioptricks, as we have chosen it for an example. Let FGEBC (fig. 12.) represent



present a well polished glass cube, standing upon a plane board NIPO; at the end of which there is another NABI, fixed at right angles, having the same height CH with the side of the cube; and let their common breadth IN be greater than the side IH of the cube, and the length ON be much longer than either; then let these boards, with the cube fixed on them, be turned to the sun at different altitudes above the horizon, and note the end of the shadow of the side AB, both within the cube at K, and without it at K; then since CK is the refracted ray, and CL the unrefracted one, HCK will be the refracted angle, and HCL the angle of incidence; so that if CL be supposed the radius, HL will be the sign of the angle of incidence, and HK that of the refracted angle; so that if HK and HL be carefully measured by an exact scale of equal parts, you will have in numbers the ratio of the sines of the angle of incidence to that of the refracted angle: if instead of a cube of glass you use a little vessel of water or other liquors, you may observe the law of refraction in these mediums.

*Optick* **ANGLE**, or *ANGLE of vision*, is the angle formed at the bottom of the eye by two rays issuing from the extreme points of an object.—Thus the angle ABC (*fig. 14.*) formed by the rays AB, CB, issuing from the extreme points AC of an object, is the optick angle.

*ANGLE of communication*, in astronomy, is the difference between the true place of the sun seen from the earth, and the place of a planet reduced to the ecliptick.—Thus, let TF (*fig. 1.*) be the orbit of the earth, APG that of a planet P, S the sun, and B the planet's place reduced to the ecliptick; then will the angle TSB be the angle of communication.

*ANGLE of the sun's position*, is an angle formed by the meridian and an azimuth; or other great circle, drawn through the centre of the sun.

*ANGLE of longitude*, is an angle formed at the pole of the ecliptick between the meridian, and a circle of longitude drawn through the centre of the object.

*ANGLE of the course*, in navigation. See **COURSE** and **RHUMB**.

*ANGLE at the centre*, in fortification, is that which is found in the centre of the figure by lines drawn from the angles of the figure.

*ANGLE of a bastion*, is the angle which the two faces of the bastion form at the point of the bastion.

*ANGLE of the tenaille*, is the angle formed before the curtain by the two lines of defence.

*Flanking* **ANGLE**, is the angle formed by the line of defence, and the flank of the bastion.

*ANGLE of the circumference*, is the mixed angle formed by an arch drawn from one gorge to another.

*Diminished* **ANGLE**, is an angle formed by a line drawn from the face of the bastion to the exterior side of the polygon.

*Re-entering* **ANGLE**, is any angle in fortification whose point turns inward towards the place; that is, whose legs open inwards from the field.

*ANGLE Saliant*, is that which points outwards or whose legs open towards the place.

*ANGLE of the Polygon*, is the angle formed by two sides of the polygon.

*ANGLE of the Complement of the Line of Defence*, is the angle formed by the intersection of the two complements with each other.

*ANGLE of the Moat*, is that formed before the curtain where it is intersected.

*ANGLES of a Battalion*, in military affairs, are the last men where the ranks and files terminate.

**ANGLING**, the art of fishing with a rod, to which are fitted a line, hook, and bait.

In angling, the following rules are to be observed.

1. To place yourself so that your shadow do not at any time lie upon the water if shallow.
2. To angle in a pond near the ford where the cattle go to drink, and in rivers, in such places as the fish you intend to angle for, usually frequent; as for breams, in the deepest water; for eels, under banks; for chub, in deep shaded holes; for perch, in scowrs; for roach, in the same places; for trouts, in quick streams.

From April to October are esteemed the best times for angling; for in cold stormy weather, or bleak easterly winds, the fish will not bite. The time of the day, in the warm months, is in the morning, about nine o'clock, and in the afternoon between three and four. In order to attract the fish to the place intended for angling, it will be proper once in four or five days to cast in some corn boiled soft, garbage, worms chopt to pieces, or grains steeped in blood, and dried; and if you fish in a stream, it will be best to cast in the grains above the hook.

The best way of angling with the fly, is down the river; and in order to make them bite freely, be sure to use such baits as you know they are naturally inclined to, and in such a manner as they are accustomed to receive them.

**ANGLO-CALVINISTS**, a name given by some writers to the members of the church of England; as agreeing with the Calvinists of other countries in most points, except church-government.

**ANGLO-SAXON**, an appellation given to the language spoken by the English Saxons, in contradistinction to both the true Saxon and modern English.

**ANGON**, in the ancient military art, a kind of javelin used by the French. They darted it a considerable distance. The iron head of this weapon resembled a flower-de-luce. It is the opinion of some writers, that the arms of France are not flowers-de-luce, but the iron point of the angon, or javelin of the ancient French.

**ANGONÆUS**, or **ANCONÆUS**, in anatomy, a name given to a muscle of the arm inserted into the ancon or shoulder. See the article *MUSCLES of the Human Body*.

**ANGUILLA**, in natural history, a trivial name of a species of muræna or eel.

**ANGUINEAL**, denotes something belonging to, or resembling a snake, anguis.

**ANGUIS**, or **SNAKE**, in zoology, a genus belonging to the order amphibia serpentes.

**ANGULAR**, in a general sense, denotes something relating to, or that hath angles.

**ANGURIA**, the water-melon in botany, a genus of plants that produce male and female campaniform flowers: the male have three short filaments joined together; the female flowers rest upon an oviary supporting a cylindrical style, the oviary after becomes an oblong fleshy fruit, containing five cells filled with compressed seed.

**ANHELATIO**, or **ANHELITUS**, among physicians, a shortness of breath.

**ANIL**, in botany, a synonyme, of a species of indigofera.

**ANIMA**, among divines and naturalists, denotes the soul, or principle of life, in animals. See **SOUL**.

**ANIMA**, in a less proper sense, is used for the principle of vegetation in plants. See **VEGETATION**.

**ANIMA**, among chymists, denotes the volatile or spiritous parts of bodies.

*ANIMA Hepatis*, is a name by which some call sal martis, or salt of iron, on account of its supposed efficacy in diseases of the liver.

*ANIMA saturni*, a white powder obtained by pouring distilled vinegar on litharge, of considerable use in enamelling. See **ENAMEL**.

**ANIMA**, or **ANIMATO**, in musick, the same with allegro. See **ALLEGRO**.

**ANIMACHA**, a river of India, in the kingdom of Malabar. It rises in the kingdom of Calicut, and falls into the ocean six leagues from Cranganor. It is also the name of a town upon the river.

**ANIMADVERSION**, in matters of literature, is used to signify, sometimes correction, sometimes remarks upon a book, &c. and sometimes a serious consideration upon any point.

**ANIMAL**, in natural history, an organized body endowed with sensation: thus, minerals are said to grow or increase; plants to grow and live; but animals alone to have sensation.

The most probable and generally received opinion is, that all animals are originally produced from eggs,



in which they are contained, till their covering is penetrated, and their bulk increased by the penetration of the male seed, so as to become ready for hatching. When the animal breaks loose from the shell in its perfect form, we say the dam of it is viviparous; when the young is excluded with a hard covering round it, which we call the shell, we say the dam is oviparous. —The shell of the egg in the oviparous kind is hard and convex, the better to resist the pressure and injuries of the air, to which it must lie exposed for some time. All animals that are formed with feet, fins, or wings, and have the free power of transporting themselves from one place to another, are divided into two sexes, under each species, that they may confer their joint offices in rearing their young.

On the other hand, those animals which are confined all their life to one spot, are hermaphroditical, or have both sexes conjoined in one body, and procreate their species without the concurrence of a mate. Of this sort are limpets, and several other kinds of shell-fish. The philosophers comprehended men under the species of animals, and define him a reasonable animal: though among naturalists, &c. animals are usually confined to irrationals.

Animals may be considered either as aerial, terrestrial, aquatick, or amphibious. —We term these aerial which have wings, with which they can support themselves in the air. Terrestrial are those whose only place of rest is upon the earth. —Aquatick are those whose constant abodes are in the water. Those are stiled amphibious which live freely in the air, upon the earth, and yet are observed to live long in the water, as if they were natural inhabitants of that element.

Aerial animals may be subdivided into birds and flies. Fishes, which are the chief part of aquatick animals, may be divided into shell-fishes, scaly-fishes, and those that have neither apparent scales nor shells. And terrestrial animals may be divided into quadrupeds, or beasts; reptiles, which have many feet, and serpents which have no feet at all.

Insects, which in their several changes belong to several of the before-mentioned divisions, may be considered together as one great tribe of animals. They are called insects, from a separation in the middle of their bodies, whereby they are as it were cut into two parts, which are joined together by a small ligature, as we see in wasps, common flies, and the like. Besides all these, there are some animals that are not perfectly of these kinds, but placed as it were in the middle betwixt them, by having something of both; as beasts and birds joined together.

Animals, for the most part, have five senses, viz. seeing, hearing, smelling, tasting, and feeling. Some reptiles of the earth, and some of the aquaticks, want one or more of these senses which perfect animals enjoy.

Is it not astonishing to hear persons disputing for the reason of animals, and telling us it is only pride and prejudices that will not allow them the use of that faculty? —Reason shews itself in all occurrences of life; whereas the brute makes no discovery of such a talent, but what immediately regards his own preservation, or the continuance of his species. Animals, in their generation, are wiser than the sons of men; but their wisdom is confined to a few particulars, and lies in a very narrow compass.

Do we not observe an uniformity in all the works of animals? Why is every species, in various countries, constantly doing the same thing in the same method? Why does not every individual do its work better or worse than another individual? There cannot be a stronger proof that all their operations are derived from a mechanical and entirely material origin; for did they participate in the least degree, of that light inherent in our minds, their works would at least shew a variety, if not perfection. Every individual of the same kind would, in some of its performances, do something a little different from what another had done. No, their plan is universally the same. The order of their actions may be traced through the whole species, it is not left to each individual; and

whoever would therefore attribute a soul to animals, lies under a necessity of making but one to each species, of which every individual would be an equal partaker. This soul, therefore, would be divisible, consequently material, and of a nature entirely different from ours.

Chymists tell us, that all substances procured from animals, belong to the animal kingdom, in order to distinguish them from others which belong to the vegetable and mineral kingdoms. The earth of animals is not found to differ from that of vegetables in any respect; but the salt of animals differs very remarkably from those of vegetables, it being volatile; whereas those of vegetables, before they have undergone putrefaction, are fixed so as not to be capable of elevation by the most intense fire.

ANIMALS, in heraldry, are used both with regard to bearings and supporters. Let it be observed, that in blazoning, animals must be interpreted in the best sense, and so as to redound to the greatest honor of the bearers. For example, the fox being renowned for wit, and likewise given to filching for his prey; if this be the charge of an escutcheon, we must conceive the quality represented to be wit, and not theft. All beasts must be figured in their most noble action; as a lion rampant, a leopard or wolf passant, a horse running or vaulting, a greyhound coursing, a deer tripping, and a lamb going with a smooth pace. In like manner, every animal must be moving and looking to the right side of the shield, the right foot being placed foremost. These are the precepts given by Guillim; and yet we find that there are lions passant, couchant, and dormant, as well as rampant.

ANIMAL, used adjectively, denotes any thing belonging to, or partaking of the nature of animals. Thus,

ANIMAL *Actions*, those that are peculiar to animals. Such are sensation and muscular motion.

ANIMAL *Liquors*, a name given to the various fluids found in animal bodies, as blood, lymph, &c.

ANIMAL *Motion*, the same with what is called muscular motion.

ANIMAL *Secretion*, the separation of the several juices of the body from the blood.

ANIMAL *Spirits*, a very subtle fluid supposed to be separated from the brain, and thence diffused into all parts of the body for the performance of all animal and vital functions.

ANIMAL *System* denotes the whole class of beings endowed with animal life, otherwise called animal kingdom.

ANIMALCULE, a minute animal, scarce, if at all, visible to the naked eye.

The word is Latin, *animalculum*, a diminutive of animal.

Animalcules, though so very minute as to be only seen by the assistance of the microscope, are vastly more numerous than any other part of the animal creation. They have been discovered in most liquors, in several of the chalybeat as well as in common water: in oats, barley, wheat, peas, &c. and in the pustules of the itch.

ANIMATED, something inspired with life, or that exhibits marks of being inspired by some spirit or soul.

ANIMATED *Power*, in mechanicks, implies a man, or other animal, in contradistinction to springs, water, wind, &c.

ANIMATED *Needle*, one touched with a loadstone, or magnet. See MAGNET.

ANIME, or Gum ANIME, in natural history, is a kind of gum, or rather resin, of a friable substance, inflammable, and soluble in oil. There are two kinds of this gum-resin, distinguished by the epithets of oriental and occidental.

The oriental or Ethiopian anime, called by the Portuguese animum and animum, and in the shops gum anime, is a dry and solid resin, brought to us in large cakes or masses of an irregular figure, and of a very uncertain colour, some of them are greenish, some reddish, some brown, and some of the colour of myrrh; they all agree in this, however, that they are moderately pellucid, of a tolerable compact texture,  
light



light and easily powdered, of a fragrant smell, very inflammable, and of a resinous and somewhat bitter taste. This, which is the genuine and true anime, is now very rare in the shops. It is brought, as Garcias informs us, only from Ethiopia; but the occidental kind, or resin of the courbaril, is what is universally received in its place.

The occidental anime, is a whitish, dry, and solid resin, somewhat resembling frankincense in colour. It is often of a fine yellowish white, between that of frankincense and mastich, and in the purest pieces is very clean and transparent; in general, however, it is much inferior to the oriental.

ANIME, in heraldry, a term used when the eyes of any rapacious creature are born of a different tincture from that of the creature itself.

ANINGA, in commerce, the name of a root growing in the Antilles islands, nearly resembling the china root. It is used for refining the sugar.

ANISUM, or ANISE, in botany, a small annual umbelliferous herb, which produces flowers and seeds in July. It is cultivated in Germany; but the best seed, which is the smaller sort, comes from Spain. The seeds to be good, should be fresh, plump, free from mouldiness, accompanied with a very strong aromatick smell; they are in common use as a warm carminative, and good to expel wind out of the bowels and stomach, and are used by confectioners in sugar-plumbs of various denominations. By distillation an oil may be extracted from anniseeds, which arises from the water in a considerable quantity: this oil is of a yellowish colour, and congeals into a butyraceous white concrete; its smell, which exactly resembles that of the seeds, is extremely durable and diffusive, and its taste milder and less pungent than almost any other distilled vegetable oil.

ANKER, a liquid measure at Amsterdam, containing about thirty-two gallons English.

ANNALES, a species of history, wherein events are related in the chronological order they happened.

It differs from a perfect history, in being only a mere relation of what passes every year, as a journal is of what passes every day; whereas history relates not only the transactions themselves, but also the causes, motives, and springs of such actions. Annales require brevity only; history demands ornament.

ANNATES, among ecclesiastical writers, implies the first year's revenue of a spiritual living.

These annates were formerly given to the pope; but at the reformation they were vested in the king. Queen Anne, however, restored them to the church, by appropriating them to the augmentation of small livings.

ANNEALING, or NEALING, an operation performed on glass, earthen-ware, &c. in an oven or furnace erected for that purpose.

ANNEALING of Glass, Iron, Steel, &c. See GLASS, IRON, STEEL, TEMPERING, &c.

ANNE, or St. ANNE'S Day, a festival observed in the Greek and Latin churches, in honour of Anne or Anna, mother of the Virgin Mary. It is celebrated by the former on the ninth of December, and by the latter on the twenty-sixth of July.

ANNEXATION, in law, a term used to imply the uniting of lands or rents to the crown.

ANNI NUBILES, in law, denote the marriageable age of a woman, viz. after she has arrived at twelve.

ANNIENTED, in law signifies annulled or made void.

ANNIHILATION, the act of reducing any created being into nothing.

ANNIVERSARY, the annual return of any remarkable day.

Anniversary days, in old times, more particularly denoted those days in which an office was performed for the souls of the deceased, or the martyrdom of the saints was celebrated in the church.

ANNO DOMINI, *i. e.* the year of our Lord, the computation of time from our Saviour's incarnation.

ANNOISANCE, in law, the same with nuisance. See the article NUISANCE.

ANNOMINATION, in rhetoric, the same with what is called *paronomasia*. See PARONOMASIA.

ANNONA; in Roman antiquity denotes provision for a year of all sorts, as of flesh, wine, &c. but especially of corn. It is also the allowance of oil, salt, bread, flesh, corn, wine, hay, and straw, which was annually provided by contractors for the maintenance of an army.

ANNONÆ *Præfatus*, in antiquity, an extraordinary magistrate, whose business it was to prevent a scarcity of provision, and to regulate the weight and fineness of bread.

ANNOTATION, in matters of literature, a brief commentary, or remark upon a book or writing, in order to clear up some passage, or draw some conclusion from it.

ANNOTTO, in dying, an elegant red colour, formed from the pellicles of the seeds of a tree common in South America. It is also called orlean, and roucou.

ANNUAL, in a general sense, is an epithet applied to whatever returns yearly, or is performed within that space of time. Thus we say, the annual motion of the earth, annual plants, &c.

ANNUITY, a yearly rent or revenue, paid either for term of life, or of years, or in fee, and for ever.

In common law, the difference between a rent and an annuity, consists in this, that rent is payable out of land; whereas an annuity charges only the person of the grantor; and that, for the recovery of a rent, an action lies: whereas for that of an annuity, there only lies a writ of annuity against the grantor, his heirs and successors. Add, that annuities are never taken for assets, as being no freeholds in law.

For the computation of the value of annuities in arrears on lives, in perpetuity, &c. See INTEREST *Simple and Compound*.

ANNULAR, in a general sense, something in the form of, or resembling a ring. It is also a peculiar denomination for the fourth finger, commonly called the *ring-finger*.

ANNULATA, in zoology, a species of *coluber*. See the article COLUBER.

ANNULET, in architecture, a small square member in the Dorick capital, under the quarter-round.

Annulet is also a narrow flat moulding, which is common to divers places of the columns, as in the bases, capitals, &c. It is the same number which Vitruvius calls a fillet; Palladio, a listel or cincture; Scamozzi and Mr. Brown, a supercilium, list, tinea, eye-brow, square and rabbit.

The hieroglyphick of the annulet is very various: some of the ancients used it to denote servitude; the Romans represented by it liberty and nobility. It is an emblem of secrecy, if it have a seal; and of love, if the cypher, the face, or the arms of the person beloved are engraved upon it.

ANNULET, in heraldry, a mark of distinction which the fifth brother of a family ought to bear in his coat of arms.

ANNULLING, a term sometimes used for canceling, or making void, a deed, sentence, or the like.

ANNUNCIADA, ANNUNTIADA, or ANNUNTIATA, an order of knighthood in Savoy, first instituted by Amadeus I. in the year 1409; their collar was of fifteen links interwoven one with another in form of a true lover's knot, and the motto F. E. R. T. signifying *fortitudo ejus Rhodum tenuit*. Amadeus VIII. gave the name annunciada to this order, which was formerly known by that of the knot of love, changing, at the same time, the image of St. Maurice, patron of Savoy, which hung at the collar, for that of the Virgin Mary; and instead of the motto abovementioned, substituting the words of the angel's salutation.

ANNUNCIADA is also the title of several religious orders, instituted at different times, and at different places, in honour of the annunciation. See the next article.

ANNUNCIATION, the tidings brought by the angel Gabriel to the Virgin Mary, of the incarnation of Christ.

Annunciation is also a festival, kept by the church



On the twenty-fifth of March, in commemoration of these tidings: it is of very great antiquity.

In the Romish church, on this feast the pope performs the ceremony of marrying or cloystering a certain number of maidens, who are presented to him in the church della Minerva, cloathed in white serge, and muffled up from head to foot: an officer stands by, with purses containing notes of fifty crowns, for those who make choice for marriage, and notes of an hundred for those who choose the veil.

Annunciation is likewise a title given by the Jews to part of the ceremony of their passover.

ANODYNE, in pharmacy, a term applied to medicines which mitigate pain.

Among anodynes may be reckoned all relaxing remedies, diluters, and medicines which by any means destroy acrimony, or expel wind, together with the compound medicines of the shops, which pass under this name; such as the anodyne balsam made of Castile soap, opium, camphire, saffron, and spirit of wine.

ANOLYMPIADS, *ανολυμπιαδεις*, in Grecian antiquity, an appellation given by the Elæans, to such olympick games as had been celebrated under the direction of other states besides themselves. See OLYMPIAD.

ANOMALISTICA Year, in astronomy, signifies the time that the earth takes to pass through her orbit: it is also called the periodical year. This space of time is greater than the tropical year, on account of the procession of the equinoxes.

ANOMALOUS, in a general sense, is applied to whatever is irregular, or deviates from the rule observed by other things of the like nature.

ANOMALY, in grammar, implies an irregularity or a deviation from the common rules.

ANOMALY, in astronomy, is the distance of a planet from the aphelion or apogee; or it is an irregularity in the motion of a planet, whereby it deviates from the aphelion or apogee.

Kepler distinguishes three kinds of these anomalies; mean, eccentric, and coequate, or true.

Mean ANOMALY, in the old astronomy, is the distance of a planet's mean place from the apogee.

In the modern astronomy, it is the time wherein the planet moves from its aphelion, to the mean place or point of its orbit.

ANOMALY of the *Eccentric*, or of the *Centre*, in the ancient astronomy, is an arch of the zodiack, terminated by the line of the apsides, and the line of the mean motion of the centre.

ANOMALY *Coequate*, or *True*, is the distance of the sun from his apogæum, or a planet from its aphelium, where it is seen from the sun.

ANOMOEANS, in church history, ancient heretics, who asserted that the Son was of a nature different, and in nothing like to that of the Father.

ANONIS, rest-harrow, in botany, a genus of plants, the flower of which is papilionaceous, and its fruit a turgid villose pod, containing a few kidney-like seeds.

ANONYMOUS, something that is nameless, or of which the name is concealed.

ANOREXY, in medicine, a loathing of meat, or want of appetite.

ANSÆ, in astronomy, the parts of Saturn's ring, which are to be seen on each side of that planet, when viewed through a telescope. See ASTRONOMY.

ANSER, the goose, in natural history. See GOOSE.

ANSER, in astronomy, a small star of the fifth magnitude in the milky-way, between the eagle and the swan.

ANT, in zoology, a well-known insect, much celebrated for its industry and œconomy.

The ant makes a distinct genus of insects, of the order of the *hymenoptera*, or those with the membranaceous wings; and is distinguished from the other genera of this order, by having an erect squama, or scaly body, placed between the thorax and abdomen.

Ants are all furnished with four wings, except the mules, as they are called, or those of no sex, which have none at all.

Of this genus we have the following species in England; 1. A small blackish ant. 2. A small reddish brown ant. 3. A middle-sized black ant. 4. A mid-

dle-sized reddish ant. 5. The ant or horse-ant, also known by the name of *hippomyrmex*.

ANT-EATER, in natural history, the name of an American quadruped that lives upon ants. It is as long and as tall as a middle sized dog; his hind legs resemble those of the bear; but his fore-legs are more slender. His fore feet are flat, and divided into four toes, armed with long claws; but those behind have five toes. His head is long, with a sharp prominent snout, small round black eyes, and very black ears.

He lives upon ants, as was observed above, and when he has found out one of their nests, he opens the upper part of it with his claws, that he may have room to put in his snout and tongue. This is besmeared with a slimy liquor and is soon covered with ants, when he draws it into his mouth and swallows them. He repeats this practice as long as they will run into the same snare.

The tail of this creature is very remarkable, and in some measure resembles that of the fox. It is generally two feet in length, almost flat, and covered on all sides with hair, from fifteen to twenty inches long: it is a little harsh, which gives it somewhat the appearance of a horse's tail; is very strong, and he can move it just as he pleases; when he turns it upon his back, it entirely covers it, and defends the creature from the rain, which he greatly dislikes.

ANT-HILLS, in husbandry, little hillocks of earth, which the ants throw up for their habitation for the breeding their young.

ANTA, in zoology, an American animal, resembling an ass in every respect, except that its ears are shorter.

ANTACIDS, in pharmacy, an appellation given to all medicines proper to correct acid, or four humours: such are the absorbent and obtundent classes, &c.

ANTAGONIST, *antagonista*, denotes an adversary, especially in speaking of combats and games.

ANTAGONIST *Muscles*, in anatomy, those which have opposite functions, as flexors and extensors, abductors and adductors, &c.

ANTARCTICK, something opposite to the bear; called in the Greek *arctos*, a constellation near the north pole.

ANTARCTICK circle, in geography and astronomy, a small circle of the sphere  $23^{\circ}. 30'$  distant from the south pole.

ANTARCTICK Pole, the south pole.

ANTARES, in astronomy, a fixed star of the first magnitude, otherwise called the scorpion's heart.

ANTE, in heraldry, implies that the pieces are represented as let into one another, in the form of dovetails, round swallows tails, or the like.

ANTECEDENT, in general, something that goes before another, either in order of time or place.

ANTECEDENT, in grammar, the word to which a relative refers: thus, *God whom we adore*, the word God is the antecedent.

ANTECEDENT, in logick, is the first of the two propositions in an enthymeme. See ENTHYME.

ANTECEDENT, in mathematicks, is the first of two terms of ratio, or that which is compared with the other, as in the ratio of 2 to 3, or *a* to *b*, 2 and *a* are each antecedents.

ANTECEDENT Signs, in medicine, such as are observed before a distemper is so formed as to be reducible to any particular class.

ANTECEDENT Term, in mathematicks, the first one of any ratio: thus, if the ratio be *a* : *b*, *a* is the antecedent term.

ANTECEDENCE, *antecedentia*, in astronomy, an apparent motion of a planet towards the west, or contrary to the order of the signs of the zodiack.

ANTECEDENCY, or ANTECEDENCE, in a general sense, denotes the property or prerogative of being antecedent.

ANTECESSOR, one that goes before. It was an appellation given to those who excelled in any science: Justinian applied it particularly to professors of civil law; and in the universities of France, the teachers of law take the title *antecessores* in all their theses.

ANTEDATE, in law, implies a spurious or false date, prior to the true date,

ANTE-



**ANTEDILUVIAN**, whatever existed before Noah's flood: thus the generations from Adam to Noah are called the antediluvians. There are great disputes among philosophers about the form, constitution, figure, and situation of the antediluvian earth. Dr. Burnet contends that it was only a hollow crust, with an uniform equable surface, without mountains and without seas, and in all respects different from what we now find it to be. Dr. Woodward undertakes to prove that its appearance was the same as at present; that it had the same position in respect of the sun, and consequently the same vicissitudes of seasons: and Mr. Whiston imagines, that the chaos, of which our earth was formed, had been the atmosphere of a comet; that the annual motion of the earth began as soon as it assumed a new form; but that the diurnal motion did not take place till the fall of Adam; that before the deluge the year began at the autumnal equinox; that the orbit of the earth was a perfect circle: and that the solar and lunar years were the same, each consisting of just three hundred and sixty days. The state of the antediluvian philosophy has likewise been the subject of much debate among authors.

**ANTELOPE**, in zoology, a species of goat, otherwise called *gazella*.

**ANTEMURALE**, in the ancient military art, denotes much the same with what the moderns call an out-work.

**ANTENCLEMA**, in rhetorick, called by the Latins *relatio*, is when the fault is imputed, upon any misfortune happening, to the person to whom it happened.

**ANTENNÆ**, in the history of insects, slender bodies with which nature has furnished the heads of these creatures; being the same with what in English are called horns, or feelers.

**ANTEPAGMENTA**, in the ancient architecture, the jambs of a door. They are also ornaments, or garnishings, in carved work, of men, animals, &c. made either of wood or stone, and set on the architrave.

**ANTEPENULTIMA**, in grammar, the third syllable of a word from the end, or the last syllable but two.

**ANTEPREDICAMENTS**, among logicians, certain preliminary questions tending to illustrate the doctrine of predicaments and categories.

**ANTEVIRGILIAN** *Husbandry*, a name given to Mr. Tull, to his method of horse-hoeing husbandry.

**ANTHELIX**, in anatomy, the inner protuberance of the external ear.

**ANTHELMINTICKS**, among physicians, medicines proper for destroying worms.

**ANTHEM**, a church song, consisting of some passages of scripture, set to solemn music.

**ANTHERÆ**, in botany, are the small buttons, or summits growing on the tops of the stamina of flowers, containing the male dust, which, when ripe, fecundates the ovary, rendering it prolific.

**ANTHESPORIA**, in antiquity, a Sicilian festival, instituted in honour of Proserpine. And another observed at Argos in honour of Juno.

**ANTHESTERIA**, in Grecian antiquity, festivals celebrated in the spring by the ancient Athenians, in honour of Bacchus, during which the masters feasted their slaves, as the Romans did in the time of the Saturnalia.

**ANTHESTERION**, in ancient chronology, the sixth month of the Athenian year, answering to the latter part of our November, and beginning of December.

**ANTHOCEROS**, in botany, a genus of the cryptogamia class. The calyx of the male is sessile, cylindrical, and intire; the antheræ are very long, subulated, and two valved; the calyx of the female is divided into six pieces; the seeds are three.

**ANTHOLOGION**, the title of the service book used in the Greek church.

It is divided into twelve months, containing the offices sung throughout the year, on the festivals of our Saviour, the Virgin, and other remarkable saints.

**ANTHOLOGY**, *ανθολογια*, a discourse of flowers, or of beautiful passages from any authors.

VOL. I. No. 7.

**ANTHOLOGY**, is also the name given to a collection of epigrams taken from several Greek poets.

**ANTHOLYZA**, a genus of the triandria monogynia class. The calyx is tubular, irregular, and bent back; the capsule is below the flower.

**ANTHONY**, or *Knights of St. ANTHONY*, a military order instituted by Albert duke of Bavaria, Holland, and Zealand, when he designed to make war against the Turks in 1382. The knights wore a collar of gold made in the form of a hermit's girdle, from which hung a stick cut like a crutch, with a little bell, as they are represented in St. Anthony's pictures.

St. ANTHONY'S *Fire*. See *ERYSIPELAS*.

**ANTHORISMUS**, in rhetorick, denotes a contrary description or definition of a thing, from that given by the adverse party.

**ANTHOS**, *ανθος*, a Greek term properly signifying flower, but used by some writers to denote rosemary, by way of eminence,

**ANTHOS**, is sometimes also used for the elixir of gold, as well as for a medicine, extracted from pearls.

**ANTHOSPERMUM**, a genus of plants, ranged by Linnæus among the polygamia dioecia.

**ANTHOXANTHUM**, in botany, a genus of plants, the flower of which is a bivalve glume. The stamina are two capillary filaments. The glume of the flower adheres afterwards to the seed which is single, roundish, and pointed at each end.

This genus belongs to the *diandria digynia* class of Linnæus, and is the same with what Mr. Ray calls *gramen vernum*, *spica brevi laxa*. It is the only grass, so far as yet known, which has only two stamina.

**ANTHROPOLOGY**, *ανθρωπολογια*, a discourse upon human nature. Thus Teichmeyer has given us a treatise of the animal œconomy, which is intitled *anthropologia*.

**ANTHROPOLOGY**, among divines, denotes that manner of expression by which the inspired writers attribute human parts and passions to God.

**ANTHROPOMORPHITES**, in church history, a sect of ancient hereticks, who taking every thing spoken of God in the scripture in a literal sense, particularly that passage of Genesis, in which it is said, *God made man after his own image*, maintained that God had a human shape. They are likewise called *audeans* from Audeus their leader.

**ANTI**, *αντι*, a Greek preposition, which enters into the composition of several words, both Latin, French, and English, in different senses. Sometimes it signifies *before*, as in *antichamber*, and sometimes opposite or contrary, as in the names of these medicines, *antiscorbuticks*, *antivenereal*, &c.

**ANTI**, in matters of literature, a title given to several books written in answer to others. Such are the *Anti-baillet*, *Anti-menagiana*, &c.

**ANTIADDES**, in anatomy, a name sometimes used for the glands, more usually called *tonsils*.

**ANTI-CHAMBER**, an outer chamber, for strangers to wait in, till the person to be spoken with is at leisure.

**ANTICHRIST**, among ecclesiastical writers, every one who is an adversary to Christ, fighting against his doctrine by word, pen, or sword. 1 John ii. 18. *Ye have heard that Antichrist shall come: even now there are many antichrists*. Sometimes called in Scripture, *The man of sin*, *the man of perdition*, &c.

**ANTIDATE**. See **ANTEDATE**.

**ANTIDICOMARIANITES**, in church history, hereticks who maintained that the Virgin Mary did not preserve a perpetual virginity.

**ANTIDILUVIAN**. See **ANTEDILUVIAN**.

**ANTIDOTE**, among physicians, a remedy taken to prevent, or to cure pestilential diseases, or poison.

**ANTIENT**, or **ANCIENT**, a term applied to things which existed long ago: thus, we say, ancient nations, ancient customs, &c.

**ANTIENT**, sometimes also denotes elderly, or of long standing, in opposition to young or new: thus, we say, an ancient barrister, ancient building, &c.

**ANTIENT**, in a military sense, denotes either the ensign, or the colours.

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ANTIENT,



ANTIENT, in ships of war, the streamer or flag, borne in the stern.

ANTIHECTICKS, in pharmacy, medicines good in hectical disorders.

The antihæticum poterii, is a preparation of tin, and chalybeated regulus of antimony, in equal quantities, with three times as much nitre, said to do wonders in hectical and nervous cases.

ANTICHTHONES, in ancient geography, an appellation given to the inhabitants of opposite hemispheres.

ANTICIPATION, the act of doing a thing before the time. Anticipating a payment, is to pay it before the time be expired when it is to become due.

ANTICOR, or ANTICOEUR, among farriers, an inflammation in the horse's throat; being the same with the quinzy in mankind.

ANTIMONY, in natural history, a blackish mineral substance, staining the hands, full of long, shining, needle-like striæ, hard, brittle, and considerably heavy.

It is found in different parts of Europe, as Bohemia, Saxony, Transylvania, Hungary, and France, commonly in mines by itself, intermixed with earthy or stony matters. Sometimes it is blended with the richer ores of silver, and renders the extraction of that metal difficult; antimony volatilizing a part of the silver, or, in the language of the miners, robbing the ore. It is very common to observe, as it were, long and shining needles on the surface of broken antimony; and that on which they are most distinct and visible, is esteemed the best. Sometimes these streaks are ranged with so much order, and branch out with so much regularity in certain directions, that even those that have daily opportunities of observing this phenomenon, cannot help being struck with its beauty.

The figures of the constituent molecules of this mineral may, possibly, contribute something to the formation of those needles: but the texture and configuration of the constituent parts will not alone account for the disposition of these streaks, and their arrangement with regard to each other; since upon breaking different lumps of the same antimony, and of the same shape, we often observe quite different arrangements of these streaks of needles. Let us take, for instance, equal masses of antimony, of a regular conical figure, because this mineral is generally melted in a species of crucibles which resemble a funnel, or an inverted cone. Let several of these conical masses be broken, each in several parts; and we shall find the needles of the same cone disposed in different directions, and varying in each different piece. In one of these masses, from a certain height, we may observe all the needles directed to the point of the cone; a little higher, the needles shall be horizontal, or nearly perpendicular to the former; above these we shall observe others which shall sometimes be all directed to some point of the base of the cone, and sometimes divide themselves into cones, which shall have different summits. In another of these masses, we shall find the needles disposed in a horizontal direction, but running into conical parcels, in directions quite the reverse of each other; that is, one conical parcel shall have its summit pointed to the apex of the cone, and that of the other shall be directed to the base. In some lumps we shall perceive needles every where, in others we shall discover none at all. Often these needles appear in one part of the lump, when no such thing is to be seen in the rest. Very commonly we see them disposed in parcels of a conical figure, whatever the external form and shape of the lump is; for the internal cones have no dependence upon the external conical form of the common mass.

Sometimes the needles are disposed along the sides of the cone, and their direction seems to follow the sides of the vessel in which they become fixed. Notwithstanding these varieties, the cause which contributes to the production and arrangement of these needles, is manifest; and, however little we may advert to it, seems to be owing to nothing else but that refrigeration, by means of which the mineral substance is changed from a fluid into a solid state.

It is to this refrigeration, and its progress, that the needles of antimony owe their production and direction: any substance whose fluidity depends only on the gross particles of the fire, which separate and agitate its constituent molecules, resume its former solidity, when it is left to itself, and when the particles of the fire are dissipated: now these cannot possibly be dissipated but successively, and in a certain order, which is generally such, that those parts of the melted substance, which are either next to the sides or the mouth of the crucible, first assume a consistence; then the molecules next to these become fixed, and soon till the whole mass loses its fluidity: now each fixed molecule applies itself so much the more effectually and necessarily to that which is contiguous, as the contact of each fixed molecule, with that which is contiguous, contributes not a little to fix it, and deprive it of motion. Molecules, successively added to each other, from a kind of fibres, threads, or needles, the directions of which shew the particular order in which the refrigeration has been carried on.

If the crucible was of the shape of a hollow bowl; if its sides were, every where, equally thick, equally warm, of the same consistence, and equally acted upon by an air equally cold; and if the melted substance was of the same uniform nature in all its parts, all the needles, or fibres, would be so many rays terminating in the centre of the bowl. If the substance was such, that its fixed particles were almost all of a length, we should find, also, concentric beds of needles, formed by parcels of each ray, and lying at an equal distance from the centre. But as so many remarkable circumstances do by no means occur in the ordinary refrigeration of antimony; neither is it possible they should: hence the regularities we have been speaking of, must necessarily arise.

Different medicinal effects of antimony, as depending on its different treatments, have been given us by Hoffman. He observes, that crude antimony, on account of the regulus being corrected by the sulphur, is not only safe, but in many cases a medicine of great service, both for man and other animals. That by simple fusion it acquires a degree of malignity; but a far greater if melted with half its weight of nitre, which consumes nearly all the sulphur, and leaves the regulus bare. That antimony, or its regulus, mixed with common salt, calcined over a gentle fire for several hours, and kept continually stirring, and afterwards edulcorated with water, yields an ash-grey calx, which is so fixed as to bear a melting heat, and proves a mild and safe diaphoretick, void of any malignant and emetick quality. That antimony, by calcination with a gentle fire in an earthen vessel, in the open air, changes into a calx, which melts with difficulty, and which has no malignity. That if this calx be melted with a strong fire into glass, it becomes so active, that a few grains shall occasion violent vomiting and purging, or even mortal convulsions and inflammations. That the powdered regulus, calcined in a glass vial placed in sand for several days, becomes a greyish diaphoretick powder; which reduced into regulus by fusion with powdered charcoal, nitre, and a little fat, proves again virulent. That when antimony is melted with one fourth its weight of salt of tartar, the whole poured into a mould, the scoria separated, and the more ponderous matter pulverized; the reddish powder thus obtained, is salutary: but that when antimony is melted with three or four times its weight of salt of tartar, both the scoria and the regulus are virulent. That equal parts of antimony and nitre, melted together, yield a virulent mass; but one part of antimony, with two or three of nitre, is an useful diaphoretick. That on melting the diaphoretick calces with fat, charcoal, powder and nitre, the virulent regulus is revived. And thus one preparation may be changed into another, a salutary into a poisonous, and a poisonous into a salutary one.

*Preparations of ANTIMONY.* The preparations of antimony, are extremely numerous. Lemery, in his treatise on antimony, describes no less than two hundred; among which there are many good and many useless



useless ones. That gentleman was an excellent chymist, but an unhappy philosopher; we may depend on his operations, but we should distrust his theory. With regard to the antimonials, the greater number even of the common preparations is unnecessary; many of them differing little from one another, and all of them being either emetick or diaphoretick. The preparations of antimony may be ranged, according to the general operations by which they are produced, under four heads; those obtained by solution, by distillation, by sublimation, and by calcination.

**ANTINOMIANS**, in ecclesiastical history, certain hereticks, who first appeared in the year 1535.

The word is formed from the Greek, *αντι*, against, and *νομος*, a law.

They are so called, because they reject the law; as of no use under the Gospel dispensation; not only in point of justification, disclaiming all pretensions to merit by their obedience unto it, as do all true Protestant believers; but they reject the law as in the hand of Christ for a rule of life and conversation, and therefore abandon themselves to all unholy living. They hold, that good works do not further, nor evil hinder, salvation; that the child of God cannot sin; that God never chastises any land for their sins; that murder, adultery, drunkenness, and the like, are no sins in the children of God; that an hypocrite may have all the graces that were in Adam before his fall; and the like strange opinions.

**ANTIPERISTALTICK** *Motion of the Intestines*, the reverse of the peristaltick motion.

**ANTIPERISTASIS**, in the peripatetick philosophy, an imaginary intention, or heightening of any quality, by the opposition of its contrary.

**ANTIPHONY**, in musick, the name which the Greeks gave to that kind of symphony which was executed in octave or double octave. It is likewise the answer made by one choir to another, when an anthem is sung between them.

**ANTIPODES**, in geography, a name given to those inhabitants of the globe that live diametrically opposite to one another. They lie under opposite parallels, and opposite meridians. They have the same elevation of their different poles. It is midnight with the one, when it is noon-day with the other; the longest day with the one is the shortest with the other; and the length of the day with the one is equal to the night to the other.

**ANTIPOPE**, in the Romish church, implies a person elected pope in an irregular manner, in opposition to another.

**ANTIPTOSIS**, in rhetorick, a figure which puts one case for another.

**ANTIQUARIAN Society**, a society of persons well skilled in antiquities, who meet together to communicate their observations and discoveries to one another.

A society of antiquaries was formed in the city of London, about the year 1580, by some of the most learned men in the kingdom; but, having been frequently interrupted and discontinued, very little can be said concerning the same till the year 1717, when it was again revived by a number of gentlemen, studious of antiquity in general, but more particularly desirous to obtain all possible knowledge of the antiquities of their own country. With this view they agreed to meet one evening in every week, under certain regulations; they encouraged correspondencies with all parts of the kingdom; they subscribed an annual sum to defray the expence of engraving on copper-plates, what should be thought deserving to be so preserved, and limited their number to one hundred. And in this manner they continued their weekly meeting with great reputation, till his late majesty king George II. was graciously pleased to grant them a royal charter of incorporation, dated November 2, 1751; and to declare himself their founder and patron.

Under this charter they became a body corporate, by the name of the Society of Antiquaries of London, with a power to have and use a common seal, to sue and be sued, and to take, hold, and enjoy by purchase, gift, or otherwise, any lands, tenements, or heredita-

ments, not exceeding in the whole one thousand pounds per annum. And it is therein directed, that the council of the said society shall at all times consist of twenty-one persons, the president, for the time being, always to be one; and Martin Folkes, Esq; was by charter appointed the first president; and also twenty other persons therein named to be the first council, empowering them, within two months from the date thereof, to nominate, choose, and admit as fellows of the said society, such persons as should excel in the knowledge of the antiquities and history of this and other nations, and be eminent for piety, virtue, integrity, and loyalty. The first president and council were to continue till the 23d day of April next ensuing, on which day, in every year hereafter, the council and fellows assembled to nominate and elect a president and council for the ensuing year; and it was particularly directed that eleven of the former council should be continued, and ten other persons chosen out of the members of the society: ten and no more of the council being to be changed annually. The president is empowered to nominate four persons of the council to be his deputies, and supply his place in case of sickness or absence; and the president, council, fellows, or any twenty-one or more, are empowered to make statutes, rules, orders, and by-laws, for the government and direction of the said society, their estates, goods, &c. and for the admission and removal of all and every the members and officers thereof. And the president, council, and fellows, may at any time appoint treasurers, secretaries, and clerks, may have and employ one serjeant at mace, and such other servants as they think necessary. And lastly, if at any time abuses or differences should arise, the archbishop of Canterbury, the lord chancellor or keeper of the great seal, and the lord privy seal, and the two secretaries of state for the time being, were appointed visitors, with the full power for any three of them to compose and redress such differences and abuses: provision is also made to fill up any vacancies that should happen by the death of the president or any of the council.

On the receipt of this charter, the first president and council nominated and admitted, by a writing dated the 14th of November 1757, all the former members, together with some others, in the whole one hundred and twenty-one, to be Fellows of the said Society of Antiquaries of London; and soon after drew up a body of statutes for the good government thereof, which was unanimously agreed to and confirmed in the month of July 1752.

It was enacted, that the number of members should not exceed one hundred and fifty; but that number being very soon filled up, and several men of quality and fortune, as well as persons of great learning and eminence, being continually applying to become members, which they could not be till the vacancies should happen by death, the society thought proper in the year 1755, to enlarge their number to one hundred and eighty, (to which they are limited at present) exclusive of peers, privy-counsellors, and judges, that should be chosen after that time. A little before this, the society gave up the management of their estate and revenues, the payment of monies, and the publication of their papers and drawings, which before were in the body in general, and thereby attended with many inconveniencies, entirely to the care of their council, which are now a standing committee for that purpose; and thereby the government of this society is become nearly the same as that of the Royal Society, which was doubtless a proper pattern to copy after.

On the 23d of April, being St. George's-day, the society annually elect their council and officers, viz. a president, a treasurer, two secretaries, and a director, who have the care of all their publications. Then the president appoints four of the council to be his deputies, or vice-presidents: and after the election is over, the society dine together at their own expence. Martin Folkes, Esq; was annually elected president, till his death in 1754, since which time the Right Hon. Lord Willoughby of Parham was every year chosen till his decease in 1765.



Every person desirous to be elected a fellow of this society, except peers, privy counsellors, or judges of Great-Britain or Ireland, must be recommended by three or more of the members, in a paper signed by themselves, specifying the name, addition, profession, and chief qualification of the candidate, and also the place of his abode. When this has been read at one of the society's meetings, and then hung up in their publick room, during the time of four other meetings, the election is determined by ballot. Peers, privy-counsellors, and judges of Great-Britain or Ireland, if proposed by any single member, must be balloted for immediately. Every new member must pay an admission fee of five guineas, and sign the obligation, whereby he promises that he will, to the utmost of his power, promote the honour and interest of the society, and observe the statutes and orders thereof: which being done, he is led up to the chair, when the president or vice-president rising, takes him by the hand and says, "I do, by the authority and in the name of the Society of Antiquaries of London, admit you a fellow thereof."

Every member must further pay one guinea annually for the use of the society, or ten guineas at once in lieu of all contributions.

The meetings of this society are on Thursday evenings, weekly, from about six till nine o'clock, at their house in Chancery-Lane. Their business is to receive, read, and consider all informations from their own members, or others, concerning the antiquities of all nations; (for which purpose they admit eminent foreigners to be corresponding members) but they more particularly attend to the study of the ancient history, customs, manners, grants, charters, coins, medals, camps, churches, cities, and all monuments whatever, ecclesiastical, military, or civil, which are found in or relate to Great-Britain and Ireland; and the communications they have received concerning these matters must be very valuable, as may be judged by the many curious remains of antiquity they have caused to be engraved on copper-plates, and permitted lately to be sold; though as yet they have not thought fit to publish any of their dissertations. They have a small, but choice, library, which is increasing daily; also a fine collection of prints and drawings.

ANTIQUARY, a person who studies and searches after monuments and remains of antiquity. There were formerly, in the chief cities of Greece and Italy, persons of distinction called antiquaries, who made it their business to explain the ancient inscriptions, and give every other assistance in their power to strangers, who were lovers of that kind of learning.

ANTIQUATED, something obsolete, out of date, or out of use.

ANTIQUÉ, in a general sense, something that is ancient: but the term is chiefly used by sculptors, painters, and architects, to denote such pieces of their different arts, as were made by the ancient Greeks and Romans. Thus, we say, an antique bust, an antique statue, &c.

ANTIQUITY, signifies times or ages past long ago. Thus, we say, the heroes of antiquity, &c.

ANTIQUITY, is also used to denote the works, or monuments of antiquity.

Thus, we say, England abounds in antiquities.

In this sense too, Bacon calls antiquities the wrecks of history, or such particulars as industrious persons have collected from genealogies, inscriptions, monuments, coins, names, etymologies, archives, instruments, fragments of history, &c.

ANTIQUITY likewise expresses the great age of a thing, and in this sense we say the antiquity of a family, the antiquity of a kingdom.

ANTIRRHINUM, the name used by botanical writers for a genus of plants, called in English snap-dragon.

ANTISAGOGE, in rhetoric, the same with concession. See CONCESSION.

ANTISCI, in geography, people who live on different sides of the equator, whose shadows at noon are projected opposite ways.

ANTISCORBUTICKS, among physicians, medicines good in all scorbutical cases.

ANTISEPTICKS among physicians, a denomination given to all substances that resist putrefaction. Such as salts of all kinds, vinegar, myrrh, snake-root, pepper, &c.

Dr. Pringle, in an appendix to his Observations on the Diseases of the Army, has given a very curious and useful set of experiments on antisepticks.

Antisepticks are of use in all putrid, malignant, and pestilential cases.

ANTISTOECHON, in grammar, the using one letter instead of another, as *olli* or *illi*.

ANTISTROPHE, ἀνίστροφη, in grammar, a figure by which two things mutually dependent on one another, are reciprocally converted. As the servant of the master, and the master of the servant.

ANTISTROPHE, among lyric poets, that part of a song and dance in use among the ancients, which was performed before the altar, in returning from west to east, in opposition to strophe.

ANTITACTÆ, in church history, a branch of gnosticks, who held that God was good and just, but that a creature had created evil; and, consequently, that it is our duty to oppose this author of evil, in order to avenge God of his adversary.

ANTITHENAR, in anatomy, a name given to the *adductor indicis*. See *MUSCLES of the Human Body*.

ANTITHESIS, in rhetoric, contrast, or opposition of words or sentiments; as,

*Though gentle, yet dull,  
Strong without rage, without o'erflowing full.*

ANTITHETARIUS, a term occurring in the title of a chapter of the laws of Canutus, but not in the chapter itself. It signifies a person who endeavours to acquit himself of the crime laid to his charge, by charging his accuser with the same fact.

ANTITRAGUS, in anatomy, the part of the external ear, opposed to the tragus.

ANTITRINITARIANS, is a general name given to those who deny the mystery of the Trinity, that there are three persons, and but one God. Under this title are comprehended the Macedonians and Samosatians, but more particularly the Arians and Socinians.

ANTITYPE, among ecclesiastical writers, denotes a type corresponding to some other type or figure.

ANTITYPE, in the Greek church, is an appellation given to the bread and wine, even after consecration: and hence it has been argued, that they do not believe transubstantiation; for otherwise they could not, with any propriety, call the bread and wine antitypes, figures, or similitudes after consecration.

ANTLER, among sportsmen, implies a start or branch of a deer's horn.

*Brow* ANTLER, signifies the branch next the head.

*Bes* ANTLER, the branch next above the brow antler.

ANTŒCI, in geography, are those people which live on the same meridian or different sides of the equator, but at equal distances; consequently, if their latitudes be greater than the sun's declination, their shadows will be projected different ways. They have noon at the same time, but it is winter with one when it is summer with the other; and the night of one is equal to the day of the other. If the antœci both turn their faces towards the equator, the stars and planets will rise to one on the right hand, and to the other on the left.

ANTONIAN *Water*, in the materia medica, the name of a medical water of Germany, remarkably pleasant to the taste, and esteemed good in many chronick and hypochondria cases.

ANTONOMASIA, from the Greek ἀντι, *for*, and ὄνομα, a name, in rhetoric, a figure by which the noun appellative is used instead of a proper name, and the contrary. Thus, because Sardanapalus, was a voluptuous prince, and Nero a cruel emperor, we give an epicure the name of Sardanapalus, and a barbarous prince the appellation of Nero.

ANTRUM *Highmorianum*, in anatomy, is a cavity dil-



discovered in the maxillary bone, called also sinus maxillaris.

ANTRUM *Pylori*, in anatomy, is a large cavity at the bottom of the pylorus. See PYLORUS.

ANVIL, in mechanicks, is an instrument on which the smith hammers or forges his work, and is generally placed on a large wooden block; at one end there is sometimes a round pike, or beak-iron, for the rounding of hollow work, or bending iron into different curves.

ANUS, in anatomy, the extremity of the intestinum rectum, or orifice of the fundament. It is surrounded with a large quantity of fat, that it may easily dilate in discharging its contents, and is furnished with three muscles, called elevatores and sphincter.

ANUS is also the name of a small aperture in the third ventricle of the brain, leading to the fourth ventricle of the cerebellum.

AONIDES, in mythology, one of the many appellations of the muses, so called from the Aonian mountains in Boeotia, where they were feigned to reside.

AORASIA, in antiquity, the invisibility of the gods. The opinion of the ancients with regard to the appearance of the gods to men, was, that they never shewed themselves face to face, but were known from their backs as they withdrew.

AORIST, among grammarians, a tense peculiar to the Greek language, comprehending all the tenses, or rather expressing an action in an indeterminate manner, without any regard to past, present, or future.

AORTA, in anatomy, the great artery which rises immediately from the left ventricle of the heart, and thence distributed to all parts of the body. It is divided into two grand trunks, distinguished by the epithets ascending and descending. See the article ARTERY.

The *descendens* is that part of the trunk which, after the arch-like inflection descends through the thorax and the abdomen down to the os sacrum, and is usually larger in women than in men. The *aorta* hath four tunics, a nervous, a glandulous, a muscular and a membranous one. See the article ARTERY.

APALOGICAL *Demonstration*, an indirect method of proving the truth of any proposition, by shewing the absurdity of the contrary. This method of demonstration is frequently used by Euclid in his elements of geometry.

APANAGE, or APENNAGE, in the French customs, lands assigned by a sovereign for the subsistence of his younger sons, which revert to the crown upon failure of male issue in that branch to which the lands are granted.

In England, the younger sons have no certain apnage as in France, but only what the king is pleased to bestow upon them.

APARINE, goose-grass, or clivers, in botany, a plant with a slender fibrous root, and thin, quadrangular, rough, jointed, climbing stalks. At every knot there are placed five or seven narrow rough leaves, in the form of a star: the flower is campanulated and monopetalous containing four subulated filaments; the fruit, when ripe, is dry, covered with a blackish skin, consisting of two globose berries joined together, and containing single roundish seeds. This plant grows wild in many places, and flowers in May or June: it is said to be warm and dry, and is recommended in cachexies, promoting both urine and sweat. The juice of this plant is efficacious in dropical disorders, evacuating the water by urine.

APARTMENT, a portion, or part of an house, containing the necessary conveniences for a person to reside in it.

APATHY, among the ancient philosophers, implied an utter privation of passion, and an insensibility of pain. Thus the stoicks affected an entire apathy, so as not to be ruffled by pain, nor enslaved by pleasure.

The primitive christians used the word to express a contempt for the things of this world.

APATURIA, in antiquity, a solemn feast celebrated by the Athenians in honour of Bacchus.

APE, in natural history, the English name of an animal of the monkey-kind.

A-PEEK, in the marine, the anchor is said to be a-peek when so much of the cable is drawn into the ship as to bring her perpendicularly over the spot on which the anchor is laid.

APELLITES, a sect of hereticks who sprang up in the second century, and so called from their founder Appelles, who was a disciple of Marcion. They affirmed that Christ received a body from the four elements, which at his death he rendered back to the world, and so ascended into heaven without a body. They denied the resurrection of the body, and professed the same doctrine as the Marcionites.

APEPSY, *Apepsia*, among physicians, implies crudity or a bad digestion.

APERIENS *Palpebram Rectus*, in anatomy, a muscle in the eye-lid. It arises sharp and fleshy from the profoundest part of the orbit, near the place where the optick nerve is transmitted, passing directly over the musculus attollens; it becomes tendinous, as it marches over the ball of the eye; whence it still grows broader and thinner, till it is inserted into the whole superior part of the upper eye-lid.

APERNE, in antiquity, the chariot in which the images of the gods were drawn on solemn occasions.

APERIENTS, in the materia medica, an appellation given to such medicines as facilitate the circulation of the juices in their containing vessels, by removing all obstructions.

The five greater aperient roots of the shops are smallage, fennel, asparagus, parsley, and butcher's brooms; as the five lesser ones are grass, madder, eringo, capers, and chammeoe.

APERTURE, the opening of any thing, or a hole or cleft in any continuous subject.

APERTURE, in geometry, the space between two right lines which meet in a point, and form an angle.

APERTURE, in opticks, a round hole in a turned bit of wood or plate of tin, placed within side of a telescope or microscope, near to the object glass, by means of which more rays are admitted, and a more distinct appearance of the object is obtained. It appears from experience, that the best aperture for telescopes, is nearly in subduplicate ratio of their length.

APERTURES, or APERTIONS, in architecture, are used to signify doors, windows, chimneys, outlets and inlets, for light, smoke, &c.

APERTURA *Tabularum*, in law books, the breaking open a last will and testament.

APETALOSE, or APETALOUS, among botanists, is an epithet given to such plants as have no petals, or flower-leaves.

APEX, in antiquity, the crest of a helmet, but more especially a kind of cap worn by the flamens.

APEX, among grammarians, denotes the mark of a long syllable, falsely called a long accent.

APHÆRESIS, among grammarians, a figure by which a letter or syllable is cut off from the beginning of a word.

APHEA, in mythology, a goddess worshipped by the Cretans and people of Ægina.

APHELION, or APHELIUM, in astronomy, is that point in any planet's orbit, in which it is furthest distant from the sun: being in the new astronomy, that end of the greatest axis of the elliptical orbit of the planet, most remote from the focus wherein the sun is placed.

The times of the aphelia of the primary planets, may be known by their apparent diameters appearing least; as also, by their moving slowest in a given time. They may likewise be found by calculation, the method of doing which is delivered in most astronomical writers, and De la Hire, places the aphelia for the year 1700, thus.

Table					Table				
♂ in 29°	14'	41"	of ♀	♂	♀ 6	56	10	♂	♂
♂ 10	17	14	♂	♂	♂ 31	3	40	♂	♂
♂ 0	35	25	♂	♂					

De la Hire makes the yearly motion of them to be ♂ 1' 22", ♀ 1' 34", ♂ 1' 7", ♀ 1' 26", and ♂ 1' 39".

APHIS, in zoology, the general name for the insects called in English tree-lice. The aphid has four erect wings,



wings, or none at all; its trunk is reflex; and the body is formed into two horns behind.

APHORISM, a maxim or principle of a science; or a sentence which comprehends a great deal in a few words. The term is seldom used but in medicine and law. We say the aphorisms of Hippocrates, the aphorisms of the civil law, political aphorisms, &c.

APHRACTI, in the maritime affairs of the ancients, were open vessels without any decks.

APHRODISIA, in antiquity, festivals kept in honour of Venus, the most remarkable of which was that celebrated by the Cyprians.

APHRODISIACKS, among physicians, medicines which increase the quantity of feed, and create an inclination to venery.

APHRONITRE, in natural history, a name given by the ancients to a particular kind of *natrum*, or native nitre.

APHTHÆ, in medicine, small, round, and superficial ulcers arising in the mouth.

The principal seat of this disease, is the extremity of excretory vessels, salivary glands, and, in short, all glands that furnish a humour like the saliva, as the lips, gums, &c. Children and old men are subject to the aphthæ, because the *vis vitæ* in both is languid, and the humours liable to become viscous. In the cure of the aphthæ, it will be proper to use *mel rosatum*, acidulated with the spirit of vitriol.

APHYLLANTHES, the blue Montpellier-pink, in botany, a genus of plants, with liliaceous flowers, and a capsular fruit, containing three oblong oval seeds. It belongs to the *hexandria monogymia* class of Linnæus.

APIARY, a bee-house, where bees are kept.

APICES, in botany. See ANTHÆ.

APIS, or the BEE, in zoology, a genus of insects belonging to the order of insecta hymenoptera. The mouth is furnished with two jaws, and a proboscis infolded in a double sheath; the wings are four in number, the two foremost covering those behind when at rest: in the anus or tail of the females and working bees, which are of no sex, there is a hidden sting. Linnæus enumerates no less than 55 species of the apis, viz. 1. The longicornis, or hairy yellow bee, with thread-like feelers, about the length of its body. 2. The tumulorum, or black bee, with yellow feet and jaws, and thread-like feelers, about the length of the body. 3. The clavicornis, or black bee, with clavated feelers, about the length of its body, and two yellow belts round the belly. 4. The centuncularis, or black bee, having its belly covered with yellow down. The nests of this species are made of rose-leaves curiously plaited in the form of a matt or quilt. 5. The cineraria, or black bee, with a white hairy breast, and a greenish belt round the belly. The above five species are all natives of Europe. 6. The mexicana, is a brownish bee, with bluish wings and very large. It is a native of America. 7. The carbonaria, or reddish bee, with darkish green wings; it is about the size of the mellifica, or common honey-bee, and is found in Africa. 8. The retusa, or black bee, has its legs covered with down. 9. The rufa, or brownish bee, with a white front and dusky belly. 10. The bicornis, has two horns on its front, a black head, and a hairy belly. 11. The maxillofa, or black bee, with prominent jaws, short feelers, and a cylindrical belly, covered with a yellow down. 12. The truncorum, or black smooth bee, with a white hairy front, and a yellow belly edged with white. 13. The florifomis, or black bee, with a cylindrical incurvated belly, having two tooth-like protuberances at the anus, and a kind of prickles on the hind-legs. This bee sleeps in flowers. 14. The dentata, or shining green bee, with black wings, and a kind of teeth on the hind thighs. The tongue of this bee is almost as long as its body. The nine last species are all natives of Europe. 15. The cordata, or shining green bee, with a belly shaped like a heart, and wings of a glass colour. It is a native of the Indies. 16. The helvola, is an oblong reddish bee, with a white belly. 17. The fabriciana, or black bee, with an iron-coloured belly, and two yellow spots. 18. The fuccincta, has a yellow hairy breast, a black belly, and four white belts. The last

three are natives of Europe. 19. The zonata, is brownish and hairy, with four bluish belts on the belly. It is a native of the Indies. 20. The ænea, is hairy, and of a copper colour. 21. The cærulescens, is brownish and hairy, with a greenish belly, margined with white indentations.

22. The mellifica, or honey-bee, is furnished with downy hairs, a dusky-coloured breast, and brownish belly; the tibiæ of the hind legs are ciliated, and transversely streaked on the inside. Each foot of this bee terminates in two hooks, with their points opposite to each other; in the middle of these hooks there is a little thin appendix, which when unfolded, enables the bees to fasten themselves to glass or the most polished bodies. This part they likewise employ for collecting the small particles of wax which they find upon flowers, and for transmitting them to the middlemost joint of the two hinder feet, in which there is a little cavity, in the shape of a narrow spoon, surrounded by a number of hairs. When they have loaded their thighs with wax, they immediately carry it off to the hive. The queen and drones, who never collect wax in this manner, have no such cavity. The belly of the bee is divided into six rings or joints. In the inside of the belly there is a small bladder or reservoir, in which the honey is collected, after having passed through the proboscis and a narrow pipe which runs through the head and breast. This bladder, when full of honey, is about the size of a small pea. The sting is situate at the extremity of the belly: it is a horny substance, and hollow within, for transmitting the venomous liquor, which lies in a bladder near the anus, into the wound. The sting is generally left in the wound, and frequently draws after it the poison-bag.

As the mellifica, or honey-bee, is both an useful insect, and endowed with peculiar instincts, we shall give a particular account of its nature and oeconomy.

The queen is the only female in a hive; she is distinguished from the others by being taller, more of an oblong figure, and having ten joints in each feeler. She is likewise furnished with a sting. The fuci, males, or drones, are commonly about 1600 in a hive; they have no sting, and their feelers have eleven joints. The operariæ, spadones, or working bees, are sometimes 20,000 in a hive; they have fifteen joints in their feelers, and are armed with stings.

After a new swarm is formed, the bees immediately begin to form their cells. They begin their work at the upper part of the hive, and continue it downwards, and from one side to the other. It is not easy to discover the particular manner of their working; for notwithstanding the many contrivances used for this purpose, there are such numbers in continual motion, and succeed one another with such rapidity, that nothing but confusion appears to the sight. Some of them however have been observed carrying pieces of wax in their talons, and running to the places where they are at work, upon the combs. These they fasten to the work by means of the same talons. Each bee is employed but a very short time in this way; but there is so great a number of them that go on in a constant succession, that the comb increases very perceptibly. Besides these, there are others that run about beating the work with their wings and the hinder part of their body, probably with a view to make it more firm and solid.

The order they observe in the construction of their cells is this: they begin with laying the basis, which is composed of three rhombus's or lozenges. They build first one of the rhombus's, and draw faces on two of its sides; they then add a second rhombus to the first in a certain inclination, and draw two new faces on its two sides; and, last of all, they add a third rhombus to the two first, and raise on the two external sides of this rhombus two other faces; which compleats the cell of an hexagonal figure.

Whilst part of the bees are occupied in forming the cells others are employed in perfecting and polishing those that are new-modelled. This operation is performed by their talons, taking off every thing that is rough and uneven. These polishers are not so desul-



tory in their operations as those that make the cells; they work long and diligently, never intermitting their labor, excepting to carry out of the cell the particles of wax which they take off in polishing. These particles are not allowed to be lost; others are ready to receive them from the polishers, and to employ them in some other part of the work.

Each comb has two rows of cells opposite to each other, which have their common bases. The thickness of every comb is something less than an inch, and the depth of the cells is about five lines. Almost all the combs are built with cells of this size; except a small number of a larger kind, that are destined for the worms that produce drones.

The bases of all the combs are placed at such a distance from one another, that when the cells are finished, there is only a space left sufficient for the passage of two bees abreast. These combs are not continued from top to bottom, but are often interrupted, and have openings from one passage to another, which give a more easy and shorter communication.

The queen-bee is generally concealed in the most secret part of the hive, and is never visible but when she lays her eggs in such combs as are exposed to light. When she does appear, she is always attended by ten or a dozen of the common sort, who form a kind of retinue, and follow her wherever she goes with a sedate and grave tread. Before she lays her eggs, she examines the cells where she designs to lay them; and if she finds that they contain neither honey, wax, nor any embryo, she introduces the posterior part of her body into a cell, and fixes to the bottom of it a small white egg, which is composed of a thin white membrane, full of a whitish liquor. In this manner she goes on, till she fills as many cells as she has eggs to lay, which are generally many thousands. After the eggs lie four days in the cells, they appear in the form of small caterpillars; and generally lie twisted round, so that the two extremities touch each other. The bees then supply them with a little honey for food; the quantity of which they increase till the eighth day from the birth of the caterpillar. After this, the bees discover no more care about their young; but stop up the mouths of the cells with wax. The embryos lie in this state twelve days, during which time they undergo surprising changes. They first change their situation in the cells, and instead of being rolled up, they extend themselves along, and place their heads towards the mouth of the cell; after this, the head of the worm begins to have a small extension, which is the rudiment of the proboscis: upon the head there is likewise a black point, and at a little distance from this point, a black streak upon the back: the first lineaments of the feet likewise appear; but they are very small. After the head is formed, and the proboscis lengthened, all the other parts display themselves successively; so that the whole worm or embryo is changed into an aurelia or nymph, which is the fly almost perfect, except that it is yet white and soft, and wants that crust with which it is afterwards covered. By this transformation the worm is stripped of a white thin pellicle, which adheres to the sides of the cell. The young bee being stripped of this pellicle, and all the parts being unfolded by degrees, and changed through successive colors, from yellow to black, arrives at perfection on the twentieth day; when she cuts, with her jaws or talons, the covering of wax upon the mouth of the cells, and issues out. When the young bees first get out of the cell, they appear drowsy, but soon acquire agility and command of their members; for they have often been observed to go to the fields, and return loaded with wax the same day that they issued from the cells.

As soon as a young bee quits its cell, one of the old ones takes off the wax-cover, and kneads and employs the wax for some other purpose: another of them repairs and cleanses the cell, removing the pellicle and other fordes which were left by the young one.

It was observed above, that bees collect their wax from the pollen or farina of flowers; and carry it to the hive. When they arrive there, they support themselves on their two fore-feet, and make a buzz with

their wings, thereby warning the bees within to assist them to unload; which they instantly do, each taking a small portion of the wax from the hinder-legs of the loaded ones, till the whole be exhausted. The wax is not only employed for the original construction of the combs and cells, but is collected and laid up in considerable quantities for the purposes of repairing any damage that may happen to the works during the winter, when they have no opportunity of collecting it in the fields, and likewise to stop up the mouths of the cells when full of honey or embryos. Bees have often been observed to dilute their wax, when too hard, by means of some liquor or saliva which they emit upon it, in order to render it soft and pliable for use.

The honey, as well as the wax, is collected from flowers. The honey, however, is extracted from a different part of the flower. In the flowers of many plants there are nectaria or nectariferous glands, which secrete from the plant a pure transparent liquor, resembling virgin-honey both in taste and appearance, excepting that it is thinner. Perhaps all the change that this nectariferous juice undergoes, by being sucked up, and deposited in the honey-bag of the bee, is, that the more watery parts may probably be absorbed during the small time it remains there. The heat of the hive, after it is deposited in the cells, will still evaporate more of the watery parts, and bring it to the consistence of honey.

When a bee is collecting honey, she no sooner lights upon a flower than she extends her proboscis, and sucks up what she can find: if she cannot find a sufficient quantity to fill her bag in one flower, she immediately flies to another, and thus goes on till she has filled it. She then retires to the hive, goes to the cell, disgorges the honey, and again returns to the fields in quest of more. As the quantity carried home by one bee is but small, it requires the labour of many to fill a cell with honey. When the cells are full, they are immediately closed up with wax, if designed for winter-provision; if not they are allowed to remain open for the common nourishment of the swarm.

Besides these capital instincts of bees, they are possessed of others, some of which are equally necessary for their preservation and happiness. They anxiously provide against the entrance of insects into the hive, by gluing up with wax the smallest holes in the skep. Some stand as centinels at the mouth of the hive, to prevent insects of any kind from getting into it. But if a snail, or other large insect, should get in, notwithstanding all resistance, they sting it to death, and then cover it over with a coat of wax, to prevent the bad smell or maggots which might proceed from the putrefaction of such a large animal. Bees are seldom overtaken with bad weather; they seem to be warned of its appearance by some particular feeling. Cold is a great enemy to them. To defend themselves against its effects during a cold winter, they crowd together in the middle of the hive, and buzz about, and thereby excite a warmth which is often perceptible by laying the hand upon the glass-windows of the hive. They seem to understand one another by the motions of their wings. When the queen wants to quit the hive, she gives a little buzz, and all the others immediately follow her example, and retire along with her. They expell the drones before the winter, so that, of several hundreds in a hive, not one can be seen after the month of October. This expulsion always occasions a furious battle between the drones and the working bees; but the latter being greatly superior in number, always prevail.

With regard to HIVES, those made of straw are the best, on many accounts: they are not liable to be overheated by the rays of the sun; they keep out cold better than wood or any other materials; and the cheapness renders the purchase of them easy. As the ingenious Mr. Wildman's hives are reckoned to be of a preferable construction to any other, we shall give an account of them in his own words.

“My hives,” says he, “are seven inches in height, and ten in width. The sides are upright, so that the top and bottom are of the same diameter. A hive holds



holds nearly a peck. In the upper row of straw, there is a hoop of about half an inch in breadth, to which are nailed five bars of deals, full a quarter of an inch in thickness, and an inch and quarter wide, and half an inch asunder from one another; a narrow short bar is nailed at each side, half an inch distant from the bars next them, in order to fill up the remaining parts of the circle; so that there are in all seven bars of deal, to which the bees fix their combs. The space of half an inch between the bars allows a sufficient and easy passage for the bees from one hive to another. In order to give great steadiness to the combs, so that, upon moving the hive, the combs may not fall off, or incline out of their direction, a stick should be run through the middle of the hive, in a direction directly across the bars, or at right angles with them. When the hives are made, a piece of wood should be worked into the lower row of straw, long enough to allow a door for the bees, of four inches in length, and half an inch in height.

The proprietor of the bees should provide himself with several flat covers of straw, worked of the same thickness as the hives, and a foot in diameter, that so it may be of the same width as the outside of the hives. Before the cover is applied to the hive, a piece of clean paper, of the size of the top of the hive, should be laid over it, and a coat of cow-dung, which is the least apt to crack of any cement easily to be obtained, should be laid all round the circumference of the hive. Let the cover be laid upon this, and made fast to the hive with a packing-needle and pack-thread, so that neither cold nor vermin may enter.

Each hive should stand single on a piece of deal, or other wood, somewhat larger than the bottom of the hive: that part of the stand which is at the mouth of the hive should project some inches, for the bees to rest on when they return from the field. This stand should be supported upon a single post, two and a half feet high; to which it should be screwed very securely, that high winds, or other accidents, may not blow down both stand and hive. A quantity of foot mixed with barley-chaff should be strewed on the ground round the post, which will effectually prevent ants, slugs, and other vermin, from rising up to the hive. The foot and chaff should, from time to time, be renewed, as it is blown or washed away: though, as it is sheltered by the stand, it remains a considerable time, especially if care be taken that no weeds rise through it. Weeds, indeed, should not be permitted to rise near the hive, for they may give shelter to vermin which may be hurtful to the bees.

The stands for bees should be four yards asunder; or, if the apiary will not admit of so much, as far asunder as may be, that the bees of one hive may not interfere with those of another hive, as is sometimes the case, when the hives are near one another, or on the same stand: for the bees, mistaking their own hives, light sometimes at the wrong door, and a fray ensues, in which one or more may lose their lives.

The person who intends to erect an apiary, should purchase a proper number of hives at the latter part of the year, when they are cheapest. The hives should be full of combs, and well stored with bees. The purchaser should examine the combs, in order to know the age of the hives. The combs of that season are white, those of the former year are of a darkish yellow; and where the combs are black, the hives should be rejected, because old hives are most liable to vermin and other accidents.

If the number of hives wanted were not purchased in the autumn, it will be necessary to remedy this neglect after the severity of the cold is past in the spring. At this season, bees which are in good condition will get into the fields early in the morning, return loaded, enter boldly, and do not come out of the hive in bad weather; for when they do, this indicates they are in great want of provisions. They

are alert on the least disturbance, and by the loudness of their humming we judge of their strength. They preserve their hives free from all filth, and are ready to defend it against every enemy that approaches.

The summer is an improper time for buying bees, because the heat of the weather softens the wax, and thereby renders the combs liable to break, if they are not very well secured. The honey too being then thinner than at other times, is more apt to run out of the cells; which is attended with a double disadvantage, namely, the loss of the honey, and the daubing of the bees, whereby many of them may be destroyed. A first and strong swarm may indeed be purchased; and, if leave can be obtained, permitted to stand in the same garden till the autumn; but if leave is not obtained, it may be carried away in the night after it has been hived.

I suppose, that in the stocks purchased, the bees are in hives of the old construction. The only direction here necessary is, that the first swarm from these stocks should be put into one of my hives; and that another of my hives should in a few days be put under the old stock, in order to prevent its swarming again."

Bees never swarm till the hive be too much crowded by the young brood. It is this circumstance that induces a part of the hive to think of finding a more commodious habitation. With this view they single out a queen from among the young, with whom they take wing; and wherever she leads, the rest follow. They first begin to swarm in May, or in the end of April, but earlier or later according to the warmth of the season. They seldom swarm before ten in the morning, and seldom later than three in the afternoon. We may know when they are about to swarm, by clusters of them hanging on the outside of the hive, and by the drones appearing abroad more than usual: but the most certain sign is, when the bees refrain from flying into the fields, though the season be inviting. Just before they take flight, there is an uncommon silence in the hive; after this, as soon as one takes flight, they all follow. Before the subsequent swarmings, there is a great noise in the hives, which is supposed to be occasioned by a contest whether the young or the old queen should go out. When the bees of a swarm fly too high, they are made to descend lower, by throwing handfuls of sand or dust among them, which they probably mistake for rain. For the same purpose, it is usual to beat on a kettle or frying-pan: this practice may have taken its rise from observing that thunder or any great noise prompts such bees as are in the fields to return home.

When the bees settle in swarming, they collect themselves in a heap, and hang to each other by their feet. When they settle in two separate divisions, it generally proceeds from there being two queens in the swarm. In that case, each cluster of them may be hived separately; or one of the queens must be destroyed, to prevent the commotions which the bees would raise in order to destroy her. All the motions and settling of a swarm are directed by the queen. If she be weak, and fall to the ground, the whole swarm fall down along with her; if she rest upon a branch of a tree, they accompany her; and if the queen be caught into a hive, the swarm will instantly follow her. When a swarm is too few in number for a hive, another may be added, provided the queen belonging to it be destroyed. If that precaution be not taken, a battle will ensue, in which not only one of the queens is killed, but frequently a great many of the working bees.

Several methods of taking the wax and honey, without destroying the bees, have of late been practised. Mr. Wildman's seems both to be the easiest and safest: "Remove (says he) the hive from which you would take the wax and honey into a room, into which admits but little light, that it may appear at first to the bees as if it was late in the evening. Gently invert the hive, placing it between the frames of a chair, or other steady support, and cover it with an empty hive, keeping that side of the empty hive raised



“ raised a little which is next the window, to give the bees sufficient light to get up into it. While you hold the empty hive, steadily supported on the edge of the full hive, between your side and your left arm, keep striking with the other hand all round the full hive from top to bottom, in the manner of beating a drum, so that the bees may be frightened by the continued noise from all quarters; and they will in consequence mount out of the full hive into the empty one. Repeat the strokes rather quick than strong round the hive, till all the bees are got out of it, which in general will be in about five minutes. It is to be observed, that the fuller the hive is of bees, the sooner they will have left it. As soon as a number of them have got into the empty hive, it should be raised a little from the full one, that the bees may not continue to run from the one to the other, but rather keep ascending upon one another.

“ So soon as all the bees are out of the full hive, the hive in which the bees are, must be placed on the stand from which the other hive was taken, in order to receive the absent bees as they return from the fields.

“ If this is done early in the season, the operator should examine the royal cells, that any of them that have young in them may be saved, as well as the combs which have young bees in them, which should on no account be touched, though, by sparing them, a good deal of honey should be left behind. Then take out the other combs with a long, broad, and pliable knife, such as the apothecaries make use of. The combs should be cut from the sides and crown, as clean as possible, to save the further labor of the bees, who must lick up the honey spilt, and remove every remains of wax; and then the sides of the hive should be scraped with a table-spoon, to clear away what was left by the knife. During the whole of this operation, the hive should be placed inclined to the side from which the combs are taken, that the honey which is spilt may not daub the remaining combs. If some combs were unavoidably taken away, in which there are young bees, the parts of the combs in which they are should be returned into the hive, and secured by sticks, in the best manner possible. Place the hive then for some time upright, that any remaining honey may drain out. If the combs are built in a direction opposite to the entrance, or at right angles with it, the combs which are the furthest from the entrance should be preferred, because there they are best stored with honey, and have the fewest young bees in them.

“ Having thus finished taking the wax and honey, the next business is to return the bees to their old hive; and for this purpose place a table, covered with a clean cloth, near the stand, and giving the hive in which the bees are a sudden shake, at the same time striking it pretty forcibly, the bees will be shaken on the cloth. Put their own hive over them immediately, raised a little on one side, that the bees may the more easily enter; and when all are entered, place it on the stand as before. If the hive in which the bees are, be turned bottom uppermost, and their own hive be placed over it, the bees will immediately ascend into it, especially if the lower hive is struck on the sides to alarm them.

“ The chief object of the bees during the spring and beginning of summer, is the propagation of their kind. Honey during that time is not collected in such quantities as it is afterwards: and on this account it is scarcely worth while to rob a hive before the latter end of June; nor is it safe to do it after the middle of July, lest rainy weather prevent their restoring the combs they have lost, and laying in a stock of honey sufficient for the winter, unless there is a chance of carrying them to a rich pasture.”

Mr. Wildman, by his dexterity in the management of bees, has lately surprised the whole kingdom. He can order a swarm to light where he pleases, almost instantaneously; he can order them to settle on his head,

then remove them to his hand; command them to depart and settle on a window, table, &c. at pleasure. We shall subjoin his method of performing these feats, in his own words: “ Spectators (says he) wonder much at my attaching bees to different parts of my body, and wish much to be possessed of the secret means by which I do it. I have unwarily promised to reveal it; and am therefore under a necessity of performing that promise: but while I declare, that their fear and the queen are the chief agents in these operations, I must warn my readers that there is an art necessary to perform it, namely practice, which I cannot convey to them, and which they cannot speedily attain; yet till this art is attained, the destruction of many lives of bees must be the consequence; as every one will find on their first attempt to perform it.

“ Long experience has taught me, that as soon as I turn up a hive, and give it some taps on the sides and bottom, the queen immediately appears, to know the cause of this alarm; but soon retires again among her people. Being accustomed to see her so often, I readily perceive her at first glance; and long practice has enabled me to seize her instantly, with a tenderness that does not in the least endanger her person. This is of the utmost importance; for the least injury done to her brings immediate destruction to the hive, if you have not a spare queen to put in her place, as I have too often experienced in my first attempts. When possessed of her, I can, without injury to her, or exciting that degree of resentment that may tempt her to sting me, slip her into my other hand, and, returning the hive to its place, hold her there, till the bees missing her, are all on wing, and in the utmost confusion. When the bees are thus distressed, I place the queen wherever I would have the bees to settle. The moment a few of them discover her, they give notice to those near them, and those to the rest; the knowledge of which soon becomes so general, that in a few minutes they all collect themselves round her; and are so happy in having recovered this sole support of their state, that they will long remain quiet in their situation. Nay, the scent of her body is so attractive of them, that the slightest touch of her, along any place or substance, will attach the bees to it, and induce them to pursue any path she takes.

“ My attachment to the queen, and my tender regard for her precious life, makes me most ardently wish that I might here close the detail of the operation, which, I am afraid, when attempted by unskilful hands, will cost many of their lives; but my love of truth forces me to declare, that, by practice, I am arrived at so much dexterity in the management of her, that I can, without hurt to her, tie a thread of silk round her body, and thus confine her to any part in which she might not naturally wish to remain; or I sometimes use the less dangerous way of clipping her wings on one side.

“ I shall conclude this account in the manner of C. Furius Cresinus, who being cited before the Curule Edile and an assembly of the people, to answer to a charge of sorcery, founded on his reaping much larger crops from his small spot of ground, than his neighbours did from their extensive fields, produced his strong implements of husbandry, his well-fed oxen, and a hale young woman, his daughter; and, pointing to them, said, These, Romans, are my instruments of witchcraft; but I cannot shew you my toil, my sweats, and anxious cares. So may I say, These, Britons, are my instruments of witchcraft; but I cannot shew you my hours of attention to this subject, my anxiety and care for these useful insects; nor can I communicate to you my experience, acquired during a course of years.”

We shall conclude the history of the HONEY-BEE with the following experiments for preventing a waste of honey, and preserving the lives of bees during the winter, communicated by a gentleman near the banks of the Tweed. “ I have tried several experiments for preserving the lives of bees during the winter; and though



" though in general with little success, yet I think I  
 " have reason to continue, and advise others to fol-  
 " low, what I practised last winter. The method is  
 " very simple, and not expensive, for it is no other  
 " than keeping the bees in a cold and dark place.

" My reason for trying this experiment, was my  
 " having observed, that a certain degree of cold brought  
 " upon the bees a stupor; and that the same degree of  
 " cold continued, kept them in the same state, till  
 " they were brought into a warmer situation, which  
 " immediately restored their life and vigour." [This  
 observation is confirmed by what Mr. White says,  
 ' That bees which stand on the north side of a build-  
 ' ing, whose height intercepts the sun's beams all the  
 ' winter, will waste less of their provisions, almost by  
 ' half, than others which stand in the sun; for, sel-  
 ' dom coming forth, they eat little, and yet in the  
 ' spring are as forward to work and swarm as those  
 ' which had twice as much honey in the autumn be-  
 ' fore.' See the Rev. Mr. White's method of pre-  
 serving bees, third edition.]

" With this view I kept two hives shut up in a dark  
 " cold out-house, from the middle of September to  
 " the middle of April, without ever letting them see  
 " light: upon their being set out in the warmer air,  
 " they recovered immediately, and shewed an appear-  
 " ance of more strength than the hives did which had  
 " been kept out in the usual way. This appearance  
 " of strength continued during the summer, and they  
 " multiplied faster than I had ever observed them do  
 " before. They were rather later in swarming this  
 " year than in former summers; but the same was the  
 " case with many hives in this neighbourhood: and  
 " even though this should always happen, yet I think  
 " other advantages will do more than overbalance it.  
 " Could I go into the country early in the spring, to  
 " look after the bees myself, I would bring them into  
 " the open air some weeks sooner, carefully attend to  
 " the changes of the weather, and shut up the doors  
 " of the hive on a bad day: but this degree of care  
 " can scarcely be expected from servants and gardeners,  
 " who have many other things to attend to.

" I intend to have four hives put up this season, in  
 " the coldest dark place I can find; and as an ice-  
 " house is the steadiest and greatest cold we have, one  
 " or two of my friends who have ice-houses, have  
 " promised to put a hive upon the ice. By all ac-  
 " counts, the cold of Siberia does not kill the bees  
 " there; and in Russia, where the winters are ex-  
 " tremely severe, bees produce much honey: so I  
 " think there is not any danger to be feared from any  
 " degree of cold we can expose the bees to.

" If success continues to attend this experiment of  
 " keeping the bees asleep all the winter and spring,  
 " without consuming their honey, a great point will be  
 " gained; especially as Mr. Wildman has taught us to  
 " take the honey without killing the bees; for, by what  
 " I have observed in this country, our bees are lost  
 " chiefly by being tempted to go out in a clear sun in  
 " the spring, though perhaps a frosty wind blows, and  
 " chills them, so as to prevent their being able to re-  
 " turn to the hive; or an early warmth induces the  
 " queen to lay eggs, and a number of young bees are  
 " bred, which consume the little provision left, before  
 " the fields can afford any supply."

#### EXPLANATION of PLATE IX.

FIGURE 1. Is the queen bee. 2 Is the drone. 3. Is  
 the working bee. 4. Represents the bees hanging to  
 each other by the feet, which is the method of taking  
 their repose. 5. The proboscis or trunk, which is  
 one of the principal organs of the bees, wherewith  
 they gather the honey and take their nourishment.  
 6. One of the hind legs of a working bee, loaded  
 with wax. 7. A comb, in which the working bees  
 are bred. The cells are the smallest of any. Two  
 of them have the young bees enclosed. A royal cell  
 is suspended on one side. 8. A comb in which the  
 drones are bred, being larger than the former; the  
 young drones being included in several of them;  
 with two royal cells suspended on the side. 9. A fi-

milar comb, in which the royal cell is fixed in the  
 middle of the comb; and several common cells are  
 sacrificed to serve as a basis and support to it. In  
 general, the royal cells are suspended on the side of  
 a comb, as in (fig. 7, 8.) To the side of (fig. 9.)  
 two royal cells are begun, when they resemble pretty  
 much the cup in which an acorn lies. The other  
 royal cells have the queens included in them.

The 23d species is the *apis cunicularia*, or hairy bee,  
 with an iron-colored breast, and yellow belly. This  
 species is very like the *mellifica*; they build their nests  
 in dry sandy places. 24. The *variegata*; the breast  
 and belly are variegated with white and black spots;  
 the legs are of an iron color. It is a native of Eu-  
 rope. This species sleep in the geranium phæum, or  
 spotted crane's-bill. 25. The *rostrata* is distinguished  
 by the upper lip being inflected, and of a conical shape,  
 and by the belly being invested with bluish belts.  
 They build their nests in high sandy grounds, and there  
 is but one young in each nest. 26. The *argillosa*, or iron-  
 colored bee, has an inflected rostrum, and a crooked  
 belly, with one joint. It is a native of Surinam.  
 27. The *lagopoda* is of a greyish color, with an  
 emarginated anus. 28. The *manicata*, or black bee,  
 with hairy fore-legs; the belly is spotted with yellow;  
 and the anus is tridentated. 29. The *quatuor den-*  
*tata*, is of a dusky color, with five white belts on the  
 belly, and the anus has four teeth-like protuberances;  
 each intermediate tooth is forked. The last three spe-  
 cies are natives of Europe. 30. The *fasciata* has a  
 yellowish back, and a black belt round the edge of  
 each wing; the breast is white; the belly is variegated  
 with black and white; the legs are covered with black  
 hair; and the feelers are green. It is a native of the  
 Cape of Good Hope. 31. The *barbara*, or black bee,  
 with a yellow edging round the breast, is about the size  
 of an ant; the feelers are like threads. It is a native  
 of Barbary. 32. The *conica*, or yellow bee, with an  
 acute conical belly, and the margins of the joints or  
 segments white; it dwells in cavities of the earth.  
 33. The *anulata*, or black bee, with a black front,  
 and black rings round the legs. 34. The *ruficornis*  
 has two iron-colored spots on the breasts and feelers;  
 the belly is spotted with yellow. 35. The *feruginea*,  
 or smooth black bee, with the feelers, mouth, belly,  
 and feet of an iron color. This is a small bee, and  
 supposed to be of an intermediate kind between the bee  
 and wasp. The last three are natives of Europe.  
 36. The *ichneumonea*; the rostrum or snout is an erect  
 horn; the belly is petiolated and black; and the breast  
 is interspersed with shining gold-colored futures or  
 indented lines: the antennæ are green. It is a native  
 of America. 37. The *cariosa* is a yellowish hairy  
 bee; and the feet and front are of a bright yellow  
 color. It builds in the rotten trees of Europe.  
 38. The *violacea* is a red bee, and very hairy, with  
 bluish wings. It is a native of Europe. The *violacea* is  
 said to perforate trees, and hollow them out in a longi-  
 tudinal direction; they begin to build their cells at the  
 bottom of these holes, and deposit an egg in each cell,  
 which is composed of the farina of plants and honey,  
 or a kind of gluten. 39. The *caffra* is also red, and  
 covered with hair; the hind part of the breast and fore  
 part of the belly are yellowish. 40. The *carolina* is a  
 red hairy bee, with the upper part of the belly yellow.  
 It is a native of Carolina. 41. The *terrestris* is black  
 and hairy, with a white belt round the breast, and a  
 white anus. It builds its nest very deep in the earth.  
 42. The *hortorum* is a black hairy bee, with the fore  
 part of the breast and belly yellow. 43. The *prato-*  
*rum*, or black hairy bee, with the fore part of the  
 breast yellow, and a blackish anus. 44. The *lapidaria*,  
 or red hairy bee, with a yellow anus. It builds in  
 holes of rocks. 45. The *sylvarum*, or pale hairy bee,  
 with a black belt on the breast, and a reddish anus.  
 46. The *muscorum*, or yellow hairy bee, with a white  
 belly. It builds in mossy grounds. 47. The *hypno-*  
*rum*, or yellow hairy bee, with a black belt on the  
 belly, and a white anus. 48. The *lucorum*, or yel-  
 low hairy bee, with a white anus. The last eight spe-  
 cies



ties are all natives of Europe. 49. The *brasiliatorum*, or pale-red hairy bee, with the basis of the thighs black. This is a very large bee, every where covered with a testaceous skin. It is a native of America. 50. The *acervorum* is red and hairy and builds below ground. 51. The *subterranea* is red and hairy, with a dusky anus; it likewise builds below ground. 52. The *furinamentis* is a black hairy bee, with the whole belly, excepting the first joint or segment yellow. It is a native of Surinam. 53. The *æstuans*, or black hairy bee, with a yellow breast. 54. The *tropica*, or black hairy bee, with the hind part of the belly yellow. The two last are natives of the warm climates. 55. The *alpina* is a hairy bee, with a black breast, and yellow belly. It inhabits the mountains of Lapland.

**APIS**, in mythology, a famous deity among the Egyptians, represented by an ox, with certain external marks.

**APIUM**, parsley, in botany. See **PARSLEY**.

**APOBATERION**, in antiquity, a valedictory speech or poem made by a person on departing out of his own country, and addressed to his friends or relations.

**APOCALYPSE**, one of the sacred books of the New Testament, so called from its containing revelations concerning several important doctrines of Christianity.

**APOCOPE**, among grammarians, a figure which cuts off a letter or syllable from the end of a word.

**APOCRYPHA**, according to its original signification, implies hidden; but has been long used by ecclesiastical writers, to denote books that are doubtful with regard to their authenticity. In this sense it was used by the Jews, who called only such of their sacred books canonical as had been published by the writers themselves.

The books that are reckoned apocryphal by our church, are the books of Tobit, Judith, Esther, the book of Wisdom, Jesus the son of Sirach, Baruch the prophet, the song of the Three Children, the history of Susannah, the history of Bell and the Dragon, and first and second book of Maccabees; as well as those that are esteemed such by the church of Rome, viz. the prayer of Manasseh king of Judah, the third and fourth book of Esdras, St. Barnabas's epistle, the book of Hermos, the addition at the end of Job, and the 151st psalm.

It is no wonder that the Romish church adopted those books that are regarded by us as apocryphal, into the number of their canonical writings, as they have been so extremely serviceable to them, in supporting, I should have said in giving a gloss to certain tenets and doctrines, for which they could not have found the very shadow of a reason in the other scriptures. Happily for us we have no occasion for their assistance; and have always looked upon them as apocryphal; as they were not to be found in the catalogue of the canonical books of scripture that have been given us by Origen, Athanasius, Hilary, Cyril of Jerusalem. and all other orthodox writers, and besides were utterly unknown to the Christian church, for some ages. No books but such as have been cited by the earliest writers in support of Christianity, and approved by the council of Laodicea, are regarded by protestants as of divine authority.

**APOCYNUM**, dog's-bane, in botany, a genus of plants, whose leaves are produced opposite in pairs on the branches. The flower is monopetalous and campanulated, cut into five parts at the brim. In the bottom of the flower are five corpuscular nectariums, which are oval and surround the germen. The filaments are five in number, and very short, which are topped with oblong erect entheræ. In the centre are placed two egg-shaped germen which support two styles, scarce visible; the germen afterwards becomes a fruit or pod, which opens from the base to the top inclosing many small compressed seeds having a long pappous down adhering to them.

The down of some sorts of these plants are much used in France for stuffing easy chairs, it being ex-

tremely light and elastic; it is also used in quilts, which are very warm; on which account there are several plantations of apocynums raised in the southern parts of that kingdom. All the species of the apocynums abound plentifully with a milky juice.

**APODICTICAL** *Argument* or *Syllogism*, implies a clear convincing proof of a proposition.

**APODOSIS**, in rhetoric, the same with *axiosis*.

**APODYTERIUM**, in the ancient baths, the apartment where persons undressed and dressed themselves.

**APOGEE**, *Apogæum*, in astronomy, that point in the orbit of a planet, which is at the greatest distance from the earth.

The word is Greek, compounded of *απο*, from, and *γη*, the earth.

The apogee of the sun is that point of the earth's orbit which is at the greatest distance from the sun; and consequently the sun's apogee, and the earth's aphelion, are one and the same point.

The quantity of the motion of the apogee may be found by comparing two observations thereof made at a great distance of time, converting the difference into minutes, and dividing it by the number of years elapsed between the two observations. The quotient gives the annual motion of the apogee. Thus, from an observation made by Hipparchus, in the year before Christ, 140, whereby the sun's apogee was found 5°, 30', of Gemini; and another made by Ricciolus, in the year of Christ, 1646, wherein it was found 7°, 26', of Cancer; the annual motion of the apogee is found to be 1', 4", De la Hire, in *Tab. Astron.* p. 15, makes the apogee of the sun to be in 8°, 7', 30", of *æ* and in its annual motion 1', 2".

**APOGEE of the Moon**. See the article **MOON**.

**APOGEE of the Equant** is its furthest distance from the earth, or that point where the circumference of the equant is intersected by the line of the apsidæ, in the remotest part of the diameter.

The mean apogee of the epicycle is a point where the epicycle is cut above, by a right line drawn from its centre, to the centre of the equant, or the point of the epicycle most remote from the earth.

**APOLLINARIAN Games**, in antiquity, an appellation given to certain theatrical entertainments annually performed in honor of Apollo.

**APOLLINARIANS**, or **APOLLINARISTS**, a name given to the followers of Apollinaris, who in the fourth century was bishop of Laodicea. He maintained that Christ had no soul, but that his divinity was to him instead of one. He published many other absurd and wild doctrines, which his followers improved upon no little, by adding to them a large mixture of the errors of the Manicheans.

**APOLLONIA**, in antiquity, an annual festival celebrated by the *Ægilatians*, in honour of Apollo.

**APOLOGUE**, in matters of literature, an ingenious method of conveying instruction by means of a feigned relation called a moral fable.

The only difference between a parable and an apologue is, that the former being drawn from what passes among mankind, requires probability in the narration; whereas the apologue, being taken from the supposed action of brutes, or even of things inanimate, is not tied down to the strict rules of probability. *Æsop's* fables are a model of this kind of writing.

**APOLOGY**, a defence or excuse for some person, action, or the like, either by word or writing.

**APOMELI**, among ancient physicians, a decoction of honey and vinegar, much used as a detergent, promoter of stool, urine, &c.

**APONEUROSIS**, among physicians, a term sometimes used to denote the expansion of a nerve or tendon in the manner of a membrane; sometimes for the cutting off a nerve; and, finally, for the tendon itself.

**APOPHLEGMATIZANTS**, in pharmacy, medicines proper to clear the head from superfluous phlegm, whether by spitting, or by the nose; and consequently comprehending masticatories, and sternutatories.

**APOPHTHEGM**, a short, sententious, and instructive remark pronounced by a person of distinguished



guished character. Such are the apophthegms of Plutarch, and those of the ancients collected by Lycophthenes.

AOPHYGE, in architecture, a concave part or ring of a column, lying above or below the flat member.

The apophyge, originally, was no more than the ring or ferril, at first fixed on the extremities of wooden pillars, to keep them from splitting; which, afterwards, was imitated in stone.

AOPHYSIS, in anatomy, an excrescence from the body of a bone, of which it is a true continuous part, as a branch is of a tree.

AOPLECTICK, whatever relates or belongs to an apoplexy. Thus, we say, an apoplectick fit.

AOPLEXY, a distemper in which the patient is suddenly deprived of the exercise of all the senses, and of voluntary motion; while a strong pulse remains with a deep respiration, attended with a stertor, and the appearance of a profound sleep. This disorder arises from whatever cause is capable of preventing either totally or in part, the influx of the nervous fluid to the organs of sense, and the reflux of the same fluid from these organs to the common sensory in the brain. 1. The natural make of the body may dispose to an apoplexy, when a large head and short neck favor the congestion of blood and humors in the head; or a corpulent body renders the capillary arteries subject to compression. 2. It may be occasioned by polypous concretions in the carotid or vertebral arteries, or by an inflammatory firmness, and thick pituitous disposition of the whole mass of blood. 3. By an extravasation of the respective fluids contained in the arterial, nervous and lymphatick vessels; and, finally, by whatever obstructs the return of the blood from the vessels of the brain to the heart. Hence it appears that apoplexies are produced by various causes, and may properly enough be distinguished into sanguinous and pituitous, to which may be added serous, atrabilarious, polypous, &c.

An apoplexy may be foreseen from the frame of the body, from a knowledge of the predisposing causes; and from the first effects of these causes, as a tremor, vacillation, vertigo, stupor, deprivation of memory, and a frequent incubus. As to the cure and prevention of an apoplexy, no universal rules can be laid down; for the method of relief must vary, according to the predisposing causes and the parts principally affected. In general, however, it is necessary to procure evacuations by all possible means, by emeticks, and by acrid clysters; and not to omit external topicks to the head, which stimulate or resolve, of which kind blisters raised by cantharides are of the greatest service. During the fit, copious bleeding in the jugulars is to be used, strong volatiles to be applied to the nose, and the temples rubbed with cephalick mixtures. Arteriotomy, scarification of the occiput, and the actual cautery, are also recommended.

APOSIOPESES, *αποσιωπησις*, in rhetorick, the suppressing, or omitting to relate a part of the subject: thus the poet passes off the circumstance of Dido's killing herself.

*Dixerat, atque illam media inter talia ferro  
Collapsem adspiciunt.*

APOSTACY, the abandoning the true religion. The primitive Christian church distinguished several kinds of apostacy. The first of those who went over intirely from Christianity to judaism; the second of those who mingled judaism and Christianity together; and the third of those who complied so far with the Jews, as to communicate with them in many of their unlawful practices, without making a formal profession of their religion. But the fourth sort was of those who, after having been sometime Christians, voluntarily relapsed into Paganism.

APOSTATE, one who deserts his religion. Among the Romanists, it signifies a man who, without a legal dispensation, forsakes a religious order of which he had made profession. Hence,

APOSTATA CAPIENDO, in the English law, a writ that formerly lay against a person who having en-

tered into some order of religion, broke out again, and wandered up and down the country.

APOSTERIORI, or *demonstration APOSTERIORI*. See DEMONSTRATION.

APOSTHUME, or APOSTEM, *αποστημα*, the same with abscess. See the article ABSCESS.

APOSTIL, *apostilla*, in matters of literature, the same with a marginal note.

APOSTLE, *αποστολ*, properly signifies a messenger or person sent by another upon some business; and hence, by way of eminence, denotes one of the twelve disciples, commissioned by Jesus Christ to preach the gospel.

APOSTOLATE, the office or dignity of an apostle. See the article APOSTLE.

APOSTOLICK, or APOSTOLICAL, something connected with, or derived from the apostles.

APOSTOLICI, an early sect of Christians, who pretended to lead their lives in imitation of the apostles. They condemned marriage.

APOSTROPHE, in rhetorick, a figure by which the orator, in a vehement commotion, turns himself on all sides, and applies to the living and dead, to angels and to men, to rocks, groves, &c. Thus Adam in Milton's Paradise lost,

O woods, O fountains, hillocks, dales, and bowers,  
With other echo, &c.

APOSTROPHE, in grammar, a mark placed over a letter to shew that a vowel is cut off, as *call'd* for *called*, *th' audience* for *the audience*.

APOTACTITES, in church history, a name given to the apostolici, from the shew they made of renouncing the world, more than other men. See APOSTOLICI.

APOTEVITZ, a small city of Hungary, near the river Drave, famous for salt. See SALT.

APOTHECARY, one who practices the art of pharmacy.

This is a genteel business, and has been in great vogue of late years; there being, as it is computed, upwards of a thousand in and about London. A youth intended for this profession, should be a pretty good scholar, and have such a knowledge in the Latin tongue, as to be able to read the best writers upon the subject of botany, pharmacy, anatomy, and medicine. In London, the apothecaries are one of the city companies, and by an act which was made perpetual in the ninth year of George I. are exempted from serving upon juries, or in ward and parish offices. They are obliged to make up their medicines according to the formulas prescribed in the college dispensatory, and are liable to have their shops visited by the censors of the college, who are empowered to destroy such medicines as they think not good.

APOTHEOSIS, in antiquity, a ceremony by which the ancient Romans complimented their emperors and great men, after their death, with a place among the gods: It is described as follows. After the body of the deceased had been burnt with the usual solemnities, an image of wax, exactly resembling him, was placed on an ivory couch, where it lay for seven days, attended by the senate and ladies of the highest quality in mourning; and then the young senators and knights bore the bed of state through the Via Sacra to the old Forum, and from thence to the Campus Martius, where it was deposited upon an edifice built in form of a pyramid. The bed being thus placed amidst a quantity of spices and other combustibles, and the knights having made a solemn procession round the pile, the new emperor, with a torch in his hand, set fire to it, whilst an eagle, let fly from the top of the building, and mounting in the air with a firebrand, was supposed to convey the soul of the deceased to heaven; and thenceforward he was ranked among the gods.

APOTOME, in geometry, is the difference between two incommensurable quantities or lines.

Euclid, in 10 lib. and third definition after prop. 85. distinguishes apotomes into first, second, third, fourth, fifth, and sixth: and in the propositions immediately following, shews the method of finding them.

The first is when there are two numbers such, that the greatest is a rational one, and the difference between their squares is a square number. A second apotome



apotome is when the least number is rational, and the square root of the difference of the squares of the two numbers has a ratio in numbers to the greatest number. A third apotome is when the two numbers are both irrational, and the square root of the difference of their squares has a ratio in numbers to the greatest number. A fourth apotome is when the greatest number is rational, and the square root of the difference of the squares of the two numbers, has not a ratio to that. A fifth apotome is when the least number is rational, and the square root of the difference of the two numbers, has not a ratio in numbers to the greatest number. A sixth apotome is when the numbers are irrational, and the square root of the difference of their squares, has not a ratio in numbers to the greatest number.

The doctrine of apotomes, as laid down by Euclid in his tenth book, is a very curious subject, and worthy to be perused and improved by all those who would lay down geometrical elements, from whence might be produced the possibility or impossibility of the quadratures of curve-lineal figures, and perhaps lineal solutions of Diophantus's Problems, and others of a similar kind; though all the use one would think Euclid made of this book was only to shew the nature of the five regular bodies, which by Plato and his sect were held in great esteem.

APOTOME, in the *Theory of Musick*, by some writers, is the difference between a greater and lesser semi-tone, being expressed by the ratio of 128 to 125.

APOZEM, in pharmacy, the same with decoction. See DECOCTION.

APPARATUS, a term used to denote a complete set of instruments, or other utensils belonging to any artist or machine: thus we say a surgeon's apparatus, a chymist's apparatus, the apparatus of the air-pump, microscope, &c.

APPARENT, in a general sense, something that is visible to the eyes, or obvious to the understanding.

APPARENT *Altitude*. See the article ALTITUDE.

APPARENT *Conjunction*, in astronomy, is when the right-line connecting the centres of the two objects does not pass the centre of the earth, but through the eye of a spectator situated on its surface.

APPARENT *Diameter*, in astronomy, is the angle under which we perceive any of the heavenly objects.

There are several methods of measuring the apparent diameter of the planets; but the best and most accurate manner is by the micrometer. See MICROMETER.

The apparent diameter of the sun, moon, and planets, is found not to be the same at all times, but in each of them it increases to a certain limit, and then again decreases. And particularly it is found, that the superior planets appear much greater, when they are in opposition to the sun, than when near a conjunction; and the inferior planets appear greater, when their light is lessened, than when they shine more bright; and particularly Ricciolus says (in *Almagest. nov. lib. 7. sect. 6. c. 10. fol. 713.*) that the diameter of Mars is almost nine times greater, when in opposition to the sun, than when near a conjunction; so that, in July and August 1529, it was taken for a new star, by reason of its prodigious magnitude. See Kepler in *Astronom. Optic. c. 10. p. 333.*

The apparent diameter of the sun was observed by

	Greatest	Mean	Least
Ptolemy - - - -	33 . 20	32 . 18	31 . 20.
Tycho Brahe - -	32 . 0	31 . 0	30 . 0.
Kepler - - - -	31 . 4	30 . 30	30 . 0.
Ricciolus - - -	32 . 8	31 . 40	30 . 0.
Cassini - - - -	32 . 10	31 . 40	31 . 8.
De la Hire - - -	32 . 43	32 . 10	31 . 38.

And at present it is observed, that the sun's apparent diameter is least when he is in ♄, and greater when in ♋.

There is a twofold increase and decrease of the moon's apparent diameter, the one in the conjunctions and oppositions, and the other in the quadratures; for the apparent diameter in these is least, and in those

the greatest; and the least in the former is less than the least in the latter. In the first case we have by

	Greatest	Least
Ptolemy - - - -	31 . 20	35 . 20.
Tycho { Conjunction - -	25 . 36	28 . 48.
Opposition - -	32 . 0	36 . 0.
Kepler - - - -	30 . 0	32 . 44.
De la Hire - - -	29 . 30	33 . 30.

In the latter case by

	Least	Greatest
Ptolemy - - - -	42 . 8	55 . 0.
Tycho Brahe - - -	32 . 32	36 . 0.

Mr. Huygens, in *System. Saturn.* p. 77. has observed, by the most exact method, the least diameter of  $\text{h}$ , to be 30"; of its ring, 1'. 8"; of  $\text{u}$ , to be 1'. 4"; of  $\text{s}$ , to be 30"; of  $\text{p}$ , to be 1'. 25". Hevelius found the apparent diameter of Mercury, when seen in the sun, to be not more than 11". 4".

The greatest distance between the apparent diameter, as given by the ancients, from what the moderns observe them to be, is, that (those, such as Albatagnius and Tycho) they took them by the naked eye only; but the moderns use telescopes, by which the false light, which causes them to appear bigger than really they are, is removed. Indeed Ricciolus used telescopes; but then he wanted a micrometer, without which the thing cannot be accurately performed. As to the apparent diameters of the fixed stars, by the best instruments that have been yet invented, they have hitherto appeared but as so many points. Even Mr. Huygens says, he found the apparent diameter of the dog-star not to be more than 4".

APPARENT *Distance*, is that distance we judge an object to be from us when seen afar off, being generally very different from the true distance; because we are apt to think that all very remote objects, whose parts cannot well be distinguished, and which have no other object in view near them, to be at the same distance from us, though perhaps they may be thousands of miles, as in the case of the sun and moon.

APPARENT *Figure*, is that figure or shape which an object appears to be under, when viewed at a distance, being often very different from the true figure.

APPARITION, in a general sense, implies simply the appearance of any object. In a more limited sense, for a spectre or ghost.

APPARITION, in astronomy, signifies a star, or other heavenly object, becoming visible, which before was below the horizon.

APPARITOR, among the Romans, a general term to comprehend all attendants of judges and magistrates appointed to receive and execute their orders. Apparitor, with us, is a messenger, that serves the process of a spiritual court, or a beadle in an university, who carries the mace.

APPARURA, among old law writers, signifies furniture or tackle, particularly that belonging to a plough.

APPAUMEE, in heraldry, denotes one hand extended with the full palm appearing, and the thumb and fingers at full length.

APPEAL, in law, the removal of a cause from an inferior to a superior court or judge, when a person thinks himself aggrieved by the sentence of the inferior judge. Appeals lie from all the ordinary courts of justice to the house of lords. In ecclesiastical causes, if an appeal is brought before a bishop, it may be removed to the archbishop; if before an archdeacon, to the court of arches, and thence to the archbishop; and from the archbishop's court, to the king in chancery.

APPEAL of *maim*, is the accusing one that has maimed another.

APPEARANCE, in a general sense, the exterior surface of a thing, or that which immediately strikes the senses.

APPEARANCE, in law, signifies a defendant's filing a common or special bail, on any process issued out of a court of judicature.



**APPELLANT**, in a general sense, one who appeals from any sentence.

**APPELLANTS**, in church history, an appellation given to such of the Roman Catholick clergy, as appeal from the constitution *unigenitus*, to a general council.

**APPELLATIVE**, in grammar, a noun which is applicable to a whole species or kind, as *man*, *horse*; in contradistinction to a proper noun.

**APPENDANT**, in law, any thing that is inheritable, belonging to some more worthy inheritance; as an advowson, common, or court, may be appendant to a manor, land to an office, &c. but land cannot be appendant to land, for both are corporeal inheritances, and one thing corporeal cannot be appendant to another.

**APPENDICULA**, *Vermiformis*, in anatomy, a name by which some call the *cæcum*. See the article **COECUM**.

**APPENDIX**, in literature, a treatise added at the end of a work, to render it more complete.

**APPENDIX**, in anatomy, the same with *epiphyxis*.

**APPETITE**, *Appetitus*, in a general sense, the desire of enjoying some object, supposed to be conducive to our happiness.

When this inclination is guided by reason, and proportioned to the intrinsic value of the object, it is called rational appetite; as, on the other hand, it is denominated sensitive appetite, when we have only a blind propensity to a thing, without determinate ideas of the good qualities for which we desire it.

**APPETITE**, in medicine, a certain painful or uneasy sensation, always accompanied with a desire to eat or drink. An excessive appetite is called bulimy, or *fames canina*; a defect or loss of it, anorexy; and that after things improper for food, pica. See **BULIMY**.

**APPLAUSE**, *Applausus*, or *Plausus*, an approbation of something signified by clapping the hands; in which sense it is still practised in colleges and theatres.

**APPLE**, a well-known fruit, of a roundish figure, of considerable use both as a food, a remedy, and likewise yielding cyder.

**APPLE** is also an appellation given to several fruits, on account of their resemblance to the common apple: such are the bitter-apple, custard-apple, love-apple, mad-apple, oak-apple, &c.

**APPLICATION**, in a general sense, implies the laying two things together, in order to discover their agreement or disagreement.

**APPLICATION of one Science to another**, signifies, the use we make of applying the principles and truths belonging to one science in order to advance or complete another.

**APOGIATURA**, in musick, implies a small note inserted by practical musicians between two others.

**APPORTIONMENT**, in law, the division of a rent into parts, in the same manner as the land out of which it issues is divided.

**APPOSAL of Sheriffs**, signifies the charging them with money received on their accounts in the exchequer.

**APPOSITION**, in general, is the putting one thing by the side of another.

**APPOSITION**, in grammar, the placing two or more substantives together, in the same case, without any copulative conjunction between them; as, *ardebat Alexim, delicias domini*.

**APPOSITION**, among the naturalists, the same with juxta-position.

**APPRAISING**, the valuing or setting a price on goods. This is usually done by a sworn appraiser, who, if he values the goods too high, is obliged to take them at the price appraised.

**APPREHENSION**, in logick, the first or most simple act of the mind, whereby it perceives, or is conscious of some idea. See the article **PERCEPTION**.

**APPREHENSION**, in law, is the seizing a criminal, in order to bring him to justice.

**APPRENTICE**, a young person bound by indenture to some tradesman, in order to be instructed in the mystery or trade.

**APPROACH**, or **APPROACHING**, in a general sense the acceding, or coming together of two or more things.

*Curve of equable* **APPROACH**. See **CURVE**.

**APPROACHES**, in fortification, the works thrown up by the besiegers, in order to get nearer a fortress, without being exposed to the enemies cannon: such, in a more particular manner, are the trenches, which are connected by parallels, or lines of communication.

**APPROACHING**, in gardening, the inoculating, or ingrafting the sprig of one tree into another, without cutting it off from the parent-tree.

**APPROPRIATION**, the annexing a benefice to the proper and perpetual use of a religious house, bishoprick, college, &c. Where the king is patron, he may make appropriations himself; but in other cases, after obtaining his licence in chancery, the consent of the ordinary, patron, and incumbent is requisite. Appropriations cannot be assigned over, but those to whom they are granted may make leases of the profits.

**APPROVEMENT**, among old writers, is generally taken for the same as improvement; but in law is more particularly used for the inclosing part of a common by the lord of the manor.

If, however, there be not sufficient common left to the tenant, he may have a writ of assize and recover triple damages: in such a case also a commoner may break down the inclosures.

**APPROVER**, in law, one who, confessing he has committed a felony, accuses one or more of his accomplices. Approvers, moreover, signify bailiffs of lords in their franchises, sheriffs, and likewise, such persons as have the letting the king's demesnes in small manors. See the articles **BAILIFF**, **SHERIFF**.

**APPROXIMATION**, in arithmetick and algebra, the coming nearer and nearer to a root, or other quantity sought, without expecting to be ever able to find it exactly. See **SERIES**.

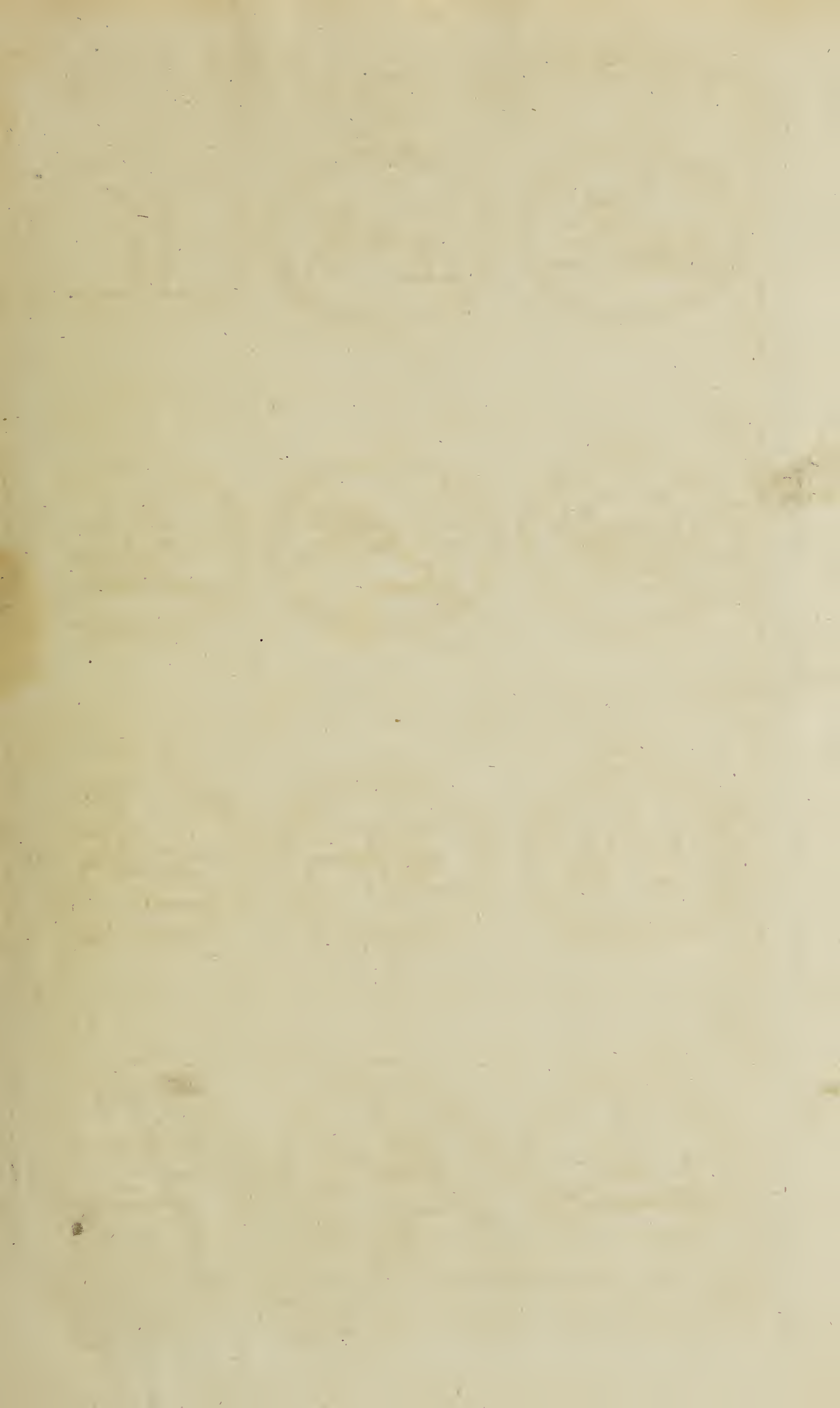
**APPUI**, in the manage, the sense of the action of the bridle in the horseman's hand. Thus we say, a horse has no appui, when he cannot suffer the bit to bear never so little upon the parts of the mouth. To give a horse a good appui, he should be galloped, and put often back.

**APPULSE**, in astronomy, the approach of a planet towards a conjunction with the sun, or any of the fixed stars. See the article **CONJUNCTION**.

**APPURTENANCES**, in common law, signify whatever things belong to another thing as principal: as hamlets, fisheries, &c. to a manor; seats in a church to houses, &c.

**APRICOT**, *Armeniaca Malus*, in botany, a genus of fruit-trees, classed by Linnæus with the prunus, or plum. Although the generative parts of the flowers agree, according to his system of botany, yet as there is very material difference not only in the plant and foliage, but also in the taste and form of the fruit, it may therefore be necessary in this work to mention them distinctly. It is said the apricot (commonly so called) is a native of Epirus, or Epire, a province of Greece, and from thence called *Malus Epirotica*, from whence the English name Apricot may be derived, though, commonly called by the Romans *Malus Armeniaca*, which implies its being originally brought from Armenia in Asia; however, there can be little doubt but that the Romans first introduced it into Italy, and from thence to other European countries. This tree, in England, grows to a tolerable size, producing roundish acuminate leaves serrated at their edges, and placed alternately on free-growing branches, though on the cursons, or spurs, they grow five or six together on a bunch. The flowers, which are roseaceous, appear early in the spring before the leaves, and are succeeded by a well-known fleshy succulent fruit. In England there are seven sorts or varieties cultivated, which are, 1. The masculine apricot, which is soonest ripe, and of a small roundish form. 2. The orange-apricot, which is the next that becomes ripe, the flavour of which is but indifferent. 3. The Algiers apricot ripens next, which is oval-shaped, compressed,







*Aries*



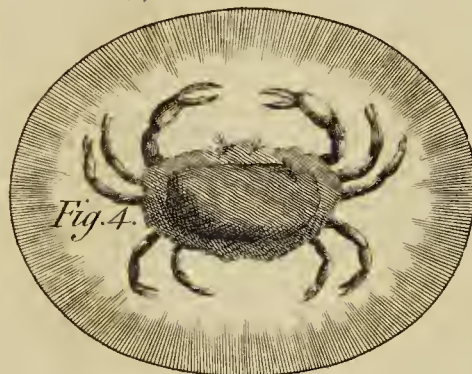
*Taurus*



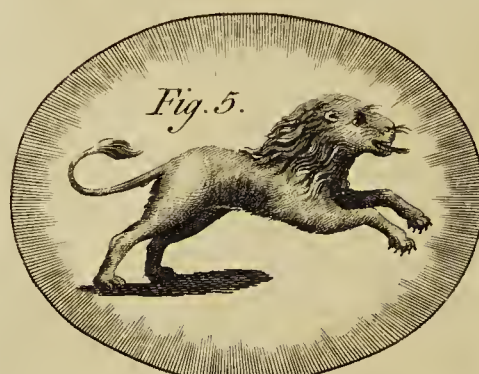
*Gemini*



*Cancer*



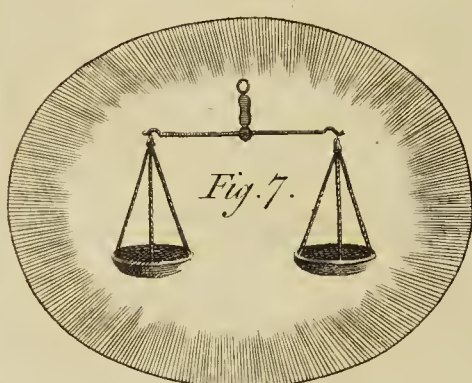
*Leo*



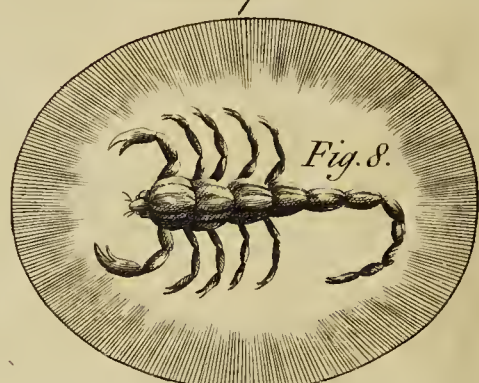
*Virgo*



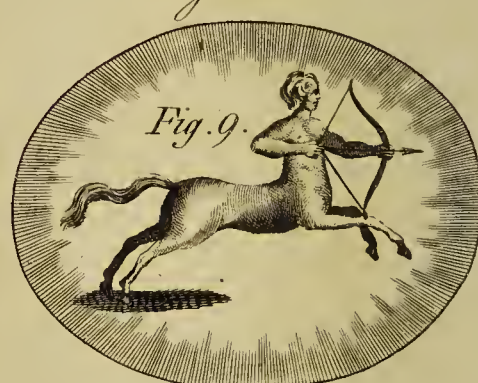
*Libra*



*Scorpio*



*Sagittarius*



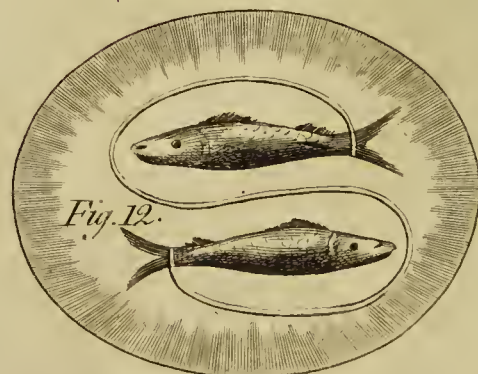
*Capricornus*



*Aquarius*



*Pisces*





pressed, and of a straw colour; this fruit is not much esteemed. 4. The Roman apricot is next in order of ripening, and larger than the Algiers. 5. The Turkey apricot, which is larger than the others, and of a globular form, ripens next, and is much better flavoured than any of those above-mentioned. 6. The Breda apricot, supposed to be a native of Africa, is a large roundish fruit, of a deep yellow when ripe; and of an orange-colour; within side the flesh is soft, full of rich juice, and higher flavoured than any of the whole tribe. 7. The Brussels apricot, is the last in ripening, it is red on the side next the sun, and of a greenish yellow within side when ripe; the flesh is firm and high-flavoured, but often cracks before it is ripe.—All the sorts of apricots, are propagated by inoculation on plumb-stocks, and trained in the nurseries either for planting against walls, or for standards; the best soil for these, or any other sort of fruit, is fresh untried earth, from a pasture taken about ten inches deep with the turf, which should be laid to rot and mellow, at least twelve months before it is used. When the former soil of the borders is taken away, this fresh earth should supply its place, and if the borders are filled with it two months before the trees are planted, the ground will be better settled and not so liable to sink after the trees are planted. The ground should be raised four or five inches above the level to allow for settling.

APRIL, in chronology, the fourth month of the year, containing thirty days.

A PRIORI, a kind of demonstration. See the article DEMONSTRATION.

APRON, in the marine, a platform or flooring of plank, raised at the entrance of a dock, a little higher than the bottom, against which the gates are shut.

APRON, in naval architecture, a piece of curved timber, fixed behind the lower part of the stem immediately above the fore-end of the keel; it is commonly formed of two pieces, and is used to strengthen the scarf or junction of the two parts of the stem.

APRON, in gunnery, a square plate of lead that covers the touch hole of a cannon, to keep the charge dry.

APSIDIS, in astronomy, is used as well for the highest part of the orbit of any planet, or the point where the planet is at the greatest distance from the sun, as the lowest part of that orbit, when the planet is the nearest to the sun. The line of the apsis, or apsidæ, is a line drawn from the perihelion to the aphelion.

APTOTE, in grammar, implies an indeclinable noun; or one which has no variation of cases.

APUS, or the bird of paradise, in astronomy, a constellation in the southern hemisphere, not visible in our latitude. It is near the southern pole, between the triangulum australe, and the chameleon; and consists of eleven stars.

In the year 1677, Dr. Halley observed the longitude and latitude of the stars in Apus, which Hevelius, in his Prodrômus, reduced with some alteration to the year 1700.

APYREXY, among physicians, implies the interval of time between the paroxysms of an intermitting fever.

AQUA, water. See the article WATER.

AQUA fortis, a corrosive liquor, made by distilling purified nitre with calcined vitriol, or rectified oil of vitriol, in a strong heat; the liquor which rises in fumes red as blood, being collected, is the spirit of nitre or aqua fortis; which serves as a menstruum for dissolving of silver, and all other metals, except gold. But if sea-salt, or sal ammoniack be added to aqua fortis, it commences aqua regia. Aqua fortis is commonly held to have been invented about the year 1300; though others will have it to have been known in the time of Moses. It is serviceable to refiners, in separating silver from gold and copper; to the workers in mosaick, for staining and coloring their woods; to dyers, in their colors, particularly scarlet; and to other artists, for coloring bone and ivory. With aqua fortis bookbinders marble the covers of books, and diamond-cutters separate diamonds from metalline powders. It is also used in etching copper or brass plates.

AQUA marina, a name by which the jeweller's call the beryl, on account of its sea-green color.

AQUA mercurialis, a solution of sublimated mercury, and a little mercury, in aqua regia.

AQUA mirabilis, the wonderful water, is prepared of cloves, galangals, cubebs, mace, cardamums, nutmegs, ginger, and spirit of wine, digested twenty-four hours, then distilled. It is a good and agreeable cordial.

AQUA omnium florum, in pharmacy, the water distilled from the dung of cows, when they go to grass; in English, *All-flower-water*.

AQUA regia, an acid corrosive spirit, so called, because it serves as a menstruum to dissolve gold, commonly esteemed the king of metals. Its basis, or essential ingredient, is common sea-salt, the only salt in nature which will operate on gold. It is commonly prepared by mixing common sea salt, or sal ammoniack, or the spirit of them, with spirit of nitre, or common aqua fortis.

AQUÆDUCT, in hydraulicks, and architecture, a conveyance made for carrying water from one place to another. Those of the ancient Romans were surprisingly magnificent. That which Lewis XIV. built near Maintenon, for carrying the Bure to Versailles, is perhaps the greatest now in the world: it is seven thousand fathoms long, with two thousand five hundred and sixty fathoms of elevation, and contains two hundred and forty two arcades.

AQUÆDUCT, in anatomy, a term applied by anatomists, to certain canals, on account of their form or use.

AQUARIANS, a name given to a sect of Christians, who appeared in the third century: they were so called because they substituted water instead of wine when they administered the sacrament.

In the earliest ages of Christianity, when the people so furiously raged together against the profelytes to this religion, its votaries were obliged to assemble by night to celebrate their holy mysteries; in which case they made use of water instead of wine, that in the morning the smell might not betray them.

Others mixed water with their wine; because water represents the people, as wine does the blood of Christ; and when both are mixed together, then Christ and his people are united. This practice was confirmed by the council of Carthage: for which two reasons are assigned; first, because it is according to the example of Christ; and, secondly, because when our Saviour's side was pierced with the spear, "straightway came there out blood and water." A better reason than any of these might be assigned for the use of water with wine in the eucharist; and that is, that the people might not drink inordinately, so as to abuse themselves, which they were wont to do, even in the apostles times; for St. Paul reproves them for it, and asks them, Whether they have not homes to drink in, that they should so abuse that holy festival?

AQUARIUS, in astronomy, a constellation which makes the eleventh sign in the zodiack, marked thus, ♒.

This constellation, of which we have given a figure, (plate IV. fig. 11.) consists of 45 stars in Ptolemy's catalogue, of forty in Tycho's, and in Mr. Flamsteed's of 108.

AQUATICK, in natural history, is an appellation given to such things as live or grow in the water.

AQUEDUCT. See AQUÆDUCT.

AQUEOUS, something abounding with water, or partakes of its nature.

AQUEOUS Humour, in anatomy, called also the albugineous humour, is the utmost of the three humours of the eye, and fills up both its camerae. In this the uvea fluctuates as it were, and moves at liberty: this humour also, when lost, will be repaired by nature.

AQUIFOLIUM, or AGRIFOLIUM. See ILEX.

AQUILA, the eagle, in natural history. See the article EAGLE.

AQUILA, in astronomy, a constellation of the northern hemisphere, represented by an eagle: and in Ptolemy's catalogue, consists of 15 stars, in Tycho's of 17, and in Mr. Flamsteed's of 71.

AQUILEGIA, *Columbine*, in botany, a plant with a branched and fibrous root, of a sweetish taste. It

has



has leaves like meadow rue, cut on the edges, and bluish underneath, but above of a dark green. The flowers are pendulous, and consist of many petals different from each other; from the middle of the flower arises the pistil, beset with stamina, which turns to a membranous fruit, consisting of many husks or pods, each of which is full of black shining seeds. The colors of the flowers are various, as blue, red, white, flesh-colored, and green, upon which account it is cultivated in gardens, and they flower in May and June. It moderately warms, dries, and opens; whence it obtains a place in prescriptions against the jaundice, and such-like ill habits, arising from obstructions. It was formerly much esteemed for throwing out eruptions; but it is now very rarely used.

**AQUILICIA**, or **AQUILICIANA**, sacrifices performed by the ancient Romans in a time of drought, to obtain rain from the gods.

**ARA**, or **ALTAR**, in astronomy, a constellation of the southern hemisphere, containing eight stars.

**ARABIAN**, something relating to Arabia, or the Arabs.

**ARABIAN Tongue**, a branch or dialect of the Hebrew.

**ARABIAN Figures**, the figures or characters generally used in arithmetical computations.

**ARABIAN Philosophy**, the philosophy in use among the ancient Arabians.

Authors of great antiquity inform us, that the ancient Arabians applied themselves very much to philosophy, and distinguished themselves by a peculiar and superior sagacity: but all they say on this head seems very uncertain. Indeed, after Islamism, learning and the study of philosophy were greatly esteemed among that people; but this has no place in history till we come to the philosophy of the middle age; and, consequently proves nothing with regard to the philosophy of the ancient inhabitants of Arabia Felix.

**ARABIAN Poetry**, in the most ancient times, was no other than rhiming; for it was destitute both of measure and cadence. But about the close of the eighth century, and during the caliphate of Al-Rachid, it became an art, and was regulated by the laws of prosody. It however still makes no distinction between long and short syllables, the whole depending on rhyme, a certain number of letters, and the observation of certain censuræ, formed by carefully distinguishing the moveable from the quiescent consonants. A syllable to which a quiescent letter is added at the end, becomes long by position; and, on the contrary, that syllable short where it is wanting.

Renaudot tells us, that the Arabian compositions in verse are still wild and irregular, being neither epic, dramatick, nor lyrick: in short, not reducible to any particular kind. Their hymns to the deity, and their tales, are in the same style. Their comparisons, in which they abound, are taken, with very little choice, from tents, camels, hunting, and the ancient manners of the Arabs.

**ARABICI**, in ecclesiastical history, the name of a sect of hereticks that appeared in Arabia, about the year 207, during the reign of the emperor Severus. Their heresy consisted in holding that the soul both dies and rises again with the body. Origin confuted them so fully, that they ingeniously acknowledged their error.

**Gum ARABIC**. See the article *GUM Arabic*.

**ARABLE Lands**, in husbandry, are those that have been actually plowed, and are proper for tillage.

**ARRACK**, or **ARACK**, a spirituous liquor imported from the East Indies. It is extracted from a vegetable juice called toddy, which flows by incision from the cocoa-nut-tree. This juice is fermented, and then distilled in the common manner; the produce is the arrack.

**ARACHNOIDES**, in anatomy, is a name given to several different membranes, as the tunick of the crystalline humor of the eye, the external lamina of the pia mater, and one of the membranes of the spinal marrow.

**ARÆOMETER**, or **WATER-POISE**, an instrument for measuring the density or gravity of fluids.

The word is formed from the Greek, *αραιος*, thin, and *μετρεω*, to measure.

This instrument is generally made of a thin glass ball with a taper neck, hermetically sealed at the top, having first as much mercury poured into the ball, as will keep it swimming in an erect position. The neck is divided into equal parts, and properly numbered; so that the lightness of the fluid is known by the depth the aræometer sinks in it; it being evident that the heavier any fluid is, the less will be the distance the instrument will sink in; and vice versa. See the article **HYDROMETER**.

**ARÆOPAGUS**, or **AREOPAGUS**. See the article **AREOPAGUS**.

**ARÆOSTYLE**, in architecture, is a term used by Vitruvius, to imply the greatest interval that can be made between columns, which consist of eight modules or four diameters.

**ARÆOTICKS**, in medicine, imply such remedies as rarefy the humours, and render them capable of passing through the pores of the skin.

**ARAIGNEE**, in fortification, signifies the branch, return, or gallery of a mine.

**ARBITER**, in civil law, a judge nominated by the magistrate, or chosen voluntarily by two parties, in order to decide their differences according to law.

The civilians make this difference between arbiter and arbitrator: though both ground their power on the compromise of the parties, yet their liberty is different, for an arbiter is to judge according to the usages of the law, but the arbitrator is permitted to use his own discretion, and accommodate the difference in the manner that appears to him most just and equitable.

**ARBITRARY**, that which is left to the choice or determination of men, or not fixed by any positive law or injunction: thus arbitrary fines, or mulcts imposed at the pleasure of the court or judge. See the article **AMERCEMENT**.

**ARBITRARY Power**. See **DESPOTISM**.

**ARBITRATION**, **ARBITRAGE**, or **ARBITREMENT**, a power given by two or more contending parties, to some person or persons to determine the dispute between them. There are five things incident to an arbitration: 1. Matter of controversy. 2. Submission. 3. Parties to the submission. 4. Arbitrators. 5. Giving up the arbitration. Matters relating to a freehold, debts due on bond, and criminal offences are not to be arbitrated.

**ARBITRATOR**. See **ARBITER**.

**ARBOR**, the Latin appellation for any tree in general.

**ARBOR**, in mechanicks, signifies the chief, or principal part of a machine, or that part which supports the rest. Thus the arbor of a wind-mill, is the post on which the mill turns; and the arbor of a water-wheel is the shaft or axis.

**ARBOREOUS**, something belonging to, or partaking of the nature of trees: thus, mosses, &c. growing on trees, are called arboreous.

**ARBORESCENT**, a term applied to all such things as resemble trees: thus we read of arboreseent shrubs, arboreseent animals, &c. of which last kind is that great natural curiosity the star-fish.

**ARBORIST**, a person skilled in that part of botany, which treats of trees. See the article **BOTANY**.

**ARBOUR**, in gardening, a kind of shady bower, formerly in great esteem, but of late rejected, on account of its being damp and unwholesome.

Arbours are generally made of lattice-work, either in wood or iron, and covered with elms, limes, horn-beams; or with creepers, as honey suckles, jasmines, or passion-flowers; either of which will answer the purpose very well, if rightly managed.

**ARBUTUS**, the strawberry-tree, in botany, a genus of ever-green trees, producing oblong leaves sawed at the edges, the flower is monopetalous and ovated, divided into five segments at the brim, which are reflexed; it hath ten short filaments joined to the bottom to the corolla, topped with bifid antheræ. At the bottom of the flower is placed a globular germen supporting a cylindrical style, crowned with a thick blunt stigma: the



the germen afterwards turns to a roundish berry very much like astrawberry, from whence the English name is taken, but divided into five cells, in which are contained many small seeds.

There are five species in this genus: 1. The common arbutus. 2. Arbutus with plain leaves, called by some adrachne. 3. Arbutus, called the billberry of Arcadia, with alaternus leaves. 4. Arbutus, called the billberry, with oblong whitish leaves. 5. Arbutus, called *uva ursi*, or bear berries. With two or three varieties of the first sort.

ARC, or ARCH. See the article ARCH.

The word is formed from the Latin, *arcus*, bow.

ARCA CORDIS, in anatomy the same with pericardium. See PERICARDIUM.

ARCADIANS, the name of a society of men of letters, who formed themselves into a body at Rome, in the year 1690, with a design to preserve learning, and carry Italian poetry to perfection.

ARCANUM, a secret, generally used to imply a remedy, whose composition is concealed, in order to increase its value.

ARCBOUTANT, in building, an arched buttress. See BUTTRESS.

ARCH, in geometry, any part of a curved line intercepted between two points.

ARCH of a Circle, is a part of that circumference less than a semi-circle. Thus, the part AB, or BC, of the circumference of the circle ABC (*Plate VII. fig. 4.*) is called an arch.

Equal ARCHES, are those which contain the same number of degrees, and whose radii are equal to each other.

Similar ARCHES, are those which contain the same number of degrees, and whose radii are unequal.

Diurnal ARCH, in astronomy, is that part of the circle which is described by an heavenly object between its rising and setting.

Nocturnal ARCH, is that part of a circle described by an heavenly object between its setting and its rising. The diurnal and nocturnal arch are always equal to a whole circle.

ARCH of Progression or Direction, is the arch of the zodiack, which a planet appears to pass over, when it moves in consequentia, or according to the order of the signs.

ARCH of Retrogradation, is an arch of the zodiack described by a planet, while it is retrograde, or its motion contrary to the order of the signs.

ARCH of Vision, is an arch of an azimuth circle intercepted between the centre of the sun, after its setting, and the horizon; when a star, before hid in his rays, begins to appear again.

ARCH, in architecture, is a vault or concave building, in form of a curve, erected to support some structure.

Arches are generally divided into three kinds, circular, elliptical, and straight, as the workmen improperly call them.

Circular ARCHES, are either semi-circular scheme, or arches of the third and fourth point.

Semicircular ARCHES, are those which are an exact semi-circle, or whose centre is in the middle of a line drawn from one foot of the arch to the other.

Scheme ARCHES, are those which are less than a semi-circle, and generally contain 70 or 90 degrees.

ARCHES of the third and fourth Point, are such as are used in Gothick structures, called by the Italians, *Di terzo e di quarto acuto*. They consist of two arches of a circle, meeting in an angle at the top, and drawn from the division of a chord, into three, four, or more parts, at pleasure.

Elliptical ARCHES, are those which consist of a semi-ellipsis, and formerly were generally used in chimnies instead of mantle-trees.

Straight ARCHES, are those used over doors and windows, having plain straight edges both upper and under, which are parallel, but both the ends and joints point toward a certain centre.

The famous *Alberti*, in his *Architecture*, says, That, in all openings in which we make arches, we ought to contrive to have the arch never less than a semi-circle, with an addition of the seventh part of half its diameter;

the most experienced workmen have found that arch to be by much the best adapted for enduring, in a manner, to perpetuity; all other arches being thought less strong for supporting the weight, and more liable to ruin.

Triumphal ARCH, a stately gate of a semicircular form, adorned with sculpture, inscriptions, &c. erected in honor of those who have deserved a triumph.

ARCHÆUS. See the article ARCHEUS.

ARCHANGEL, an intellectual substance or angel, placed in the eighth rank among the blessed spirits which compose the celestial hierarchy. The word is compounded of the Greek *αρχος*, prince, *αγγελος*, angel.

ARCHBISHOP, a prelate who hath several suffragan bishops under him. We have only two archbishops in England; the archbishop of Canterbury, who is primate of all England, and the archbishop of York, is only styled primate of England.

ARCHBISHOPRICK, in ecclesiastical geography, a province subject to the jurisdiction of an archbishop.

ARCHBUTLER, one of the great officers of the German empire, who presents the cup to the emperor on solemn occasions. This office belongs to the king of Bohemia.

ARCHCHAMBERLAIN, an officer of the empire, much the same with the great chamberlain in England. The elector of Brandenburg was appointed, by the golden bull, archchamberlain of the empire.

ARCHCHANCELLOR, an high officer, who in ancient times, presided over the secretaries of the court.

Under the two first races of the kings of France, when their territories were divided into Germany, Italy, and Arles, there were three archchancellors; and hence the three archchancellors still subsisting in Germany, the archbishop of Mentz being archchancellor of Germany, the archbishop of Cologne of Italy, and the archbishop of Treves of Arles.

ARCHCHANTOR, the president of the chantors of a church.

ARCHDEACON, an ecclesiastical dignitary or officer, next to a bishop, whose jurisdiction extends either over the whole diocese, or only a part of it. We have sixty archdeacons in England, who visit the parishes subject to their jurisdiction; enquire into abuses, suspend, excommunicate, &c. They likewise induct all clerks into their benefices.

ARCHDUKE, a title given to dukes of greater authority and power than other dukes. The archduke of Austria is among the most ancient: his principal privileges are, that he shall distribute justice in his own country without appeal; that he cannot be deprived of his countries, even by the emperor and the states of the empire; and that he have a power of creating counts, barons, &c. throughout the whole empire. See the article DUKE.

ARCHED, in a general sense, denotes something built or constructed in the fashion, or after the manner of an arch.

ARCHED Legs, a fault in a horse, when his knees are bended arch-wise.

ARCHED Fountain. See FOUNTAIN.

ARCHER, in the ancient military art, one who fought with bows and arrows. The English archers were esteemed the best in Europe, to whose prowess and dexterity the many victories over the French were in a great measure owing.

ARCHES, or Court of ARCHES, the supreme court belonging to the archbishop of Canterbury, to which appeals lie from all the inferior courts within his province.

ARCHETYPE, the first model of a work, which is copied after to make another like it. Among miners it is used for the standard weight by which the others are adjusted. The archetypal world, among Platonists, means the world as it existed in the idea of God, before the visible creation.

ARCHEUS, among chymists, a term used to denote the predominating principle of things, whereby their peculiar qualities are fixed and determined.

ARCHIL, *Archilla*, in botany, a whitish moss growing upon rocks in the Canary and Cape Verd Islands, and which yields a rich purple tincture, fugitive indeed, but extremely beautiful.



ARCHILOCHIAN, a term in poetry, applied to a sort of verses, of which Archilochus was the inventor, consisting of seven feet, the four first whereof are ordinarily dactyls, though sometimes spondees, the three last trochees; as in Horace,

*Solvitur acris hyems, gratâ vice veris & Favoni.*

ARCHIMANDRITE, was anciently the name given to a superior of a convent, and answers to what is now called a regular abbot. The word *mandrite* is Syriac, and signifies a recluse or monk.

ARCHIMEDES'S SCREW, a kind of spiral pump for raising water, invented by the famous Archimedes.

It consists of a long cylinder, with a hollow pipe, tube, or groove coiled round it, as represented in *plate VI. fig. 3.* where AB represents the cylinder, and the tube open at each end. It is placed in an oblique position to the horizon, with the lower end in the water to be pumped away, the other end being supported on the lower part of the winch A, by which the screw and cylinder are turned round.

No sooner is the screw immersed in the water, than it immediately rises therein by the orifice to the level of the surface of the water, and if the point of the helix or spiral, which in the beginning of the motion is coincident with the surface of the water, happens not to be on the lower side of the cylinder, the water will, upon the motion of the screw, move on in the spiral, till it comes to the point which is on the other side, and coincident with the surface of the water; when it is arrived to that point, it cannot afterwards possess any other part of the spiral, than that which is upon the lowest part of the cylinder; for it cannot move higher above the horizon; and since this will constantly be the case, after the water in the spiral has attained the surface, it is plain that it must always be on the under side of the cylinder.

But because the cylinder is in motion, every part of the spiral screw, will, by degrees, succeed to the said under part of the cylinder; the water, therefore, in the spiral, must succeed to every part thereof, as it comes on the lower side, that is, it must ascend on the lower part of the cylinder through all the length of the tube, till it reaches the upper orifice at A, where, because it has nothing further to support it, it will run out.

ARCHIPELAGO, in geography, a part of the sea, containing, or interrupted by, many little islands; but is most commonly applied to that part between Greece and Asia.

ARCHISYNAGOGUS, the chief of the synagogue; the title of an officer among the Jews, who presided in their synagogues and assemblies.

ARCHITECT, a person skilled in architecture, who not only draws the plans of edifices, but superintends and directs the artificers.

ARCHITECTURE, the art or science of erecting edifices, whether for habitation or defence; and hence subdivided into civil, military, and naval.

Civil architecture, called absolutely, and by way of eminence, architecture, teaches how to make any kind of buildings, as palaces, churches, private houses, &c. and the rules to be observed in it are solidity, convenience, and beauty, to which some add, order, disposition, proportion, decorum and œconomy. Solidity implies the choice of a good foundation, and sound materials; convenience consists in so ordering the parts of an edifice that they may not embarrass one another; beauty is that agreeable form and pleasing appearance, which it exhibits to the eye of a spectator; order gives each part of the building a convenient bigness, whether considered apart, or with relation to the whole; and disposition is the agreeable union of all the parts. Proportion is the relation that all the work hath to its parts, and which every one separately hath to the whole; decorum teaches to have a regard to design, custom, and nature; and œconomy to consider the expences, in order to regulate the form and magnitude of the fabrick.

With respect to the several periods and states of architecture, it is distinguished into ancient, gothick, and

modern. The Greeks and Romans were so happy in adjusting the various proportions of an edifice, that any neglect of their rules has been found to be a deviation from proportion and beauty itself. It is for this reason that the moderns have retrieved the primitive simplicity of ancient architecture, which, upon the decline of the western empire, was lost in the general confusion of arts and sciences, being succeeded by the gothick and moreish, so called from the Goths and Moors. These made perfection to consist in the delicacy and multitude of the ornaments, which they bestowed on their buildings, with abundance of care, as may be seen in most of the ancient structures in England and other parts of Europe.

The manner, then, of the ancients, being reputed the standard of beauty and grandeur, another division of architecture arises from the different proportions observed by them in different buildings, according to the bulk, strength, delicacy, richness, or simplicity required. This consists of five orders, all invented at different times, and on different occasions, viz. *Tuscan, Doric, Ionic, Corinthian, and Composite.* See *Tuscan Order, Doric Order, &c.*

Of all the ancient writers on architecture, Vitruvius is the only entire author.

The most celebrated of those who have treated that subject, since his time, are Baptista Alberti, Palladio, Scamozzi, Blondel, Goldman, Mr. Perault, Sir H. Wotton, Sturmius, and Wolfius.

*Military ARCHITECTURE*, the same with what is otherwise called fortification. See the article *FORTIFICATION*.

*Naval ARCHITECTURE*, is the art of building the hull, or body of the ship; distinct from her machinery, and furniture for sailing.

Originally all ships, for whatever use designed, appear to have been of the same form; but the various purposes of navigation soon occasioned a considerable difference, in their size, construction, and equipage, at which time they became chiefly characterized as vessels of war, burthen, or passage.

The ships of war of the ancients were distinguished from other kinds of vessels, by various turrets and accessions of building, some to defend their own soldiers, and others to annoy the enemy; and from one another, in later ages, by several degrees or ranks of oars, the most usual number of which was four or five, which appear not to have been arranged, as some imagine, on the same level in different parts of the ship; nor yet, as others have supposed, directly above one another's heads; but their seats being placed one behind another, ascended gradually like stairs. Ptolemy Philopater, urged by a vain-glorious desire of exceeding all the world besides in naval architecture, is said to have further enlarged the number of banks to forty, and the ship being otherwise equal in proportion, this raised her to such an enormous bulk, that she appeared at a distance like a floating mountain or island, and, upon a nearer view like a prodigious castle on the ocean: she contained four thousand rowers, four hundred sailors employed in other services, and near three thousand soldiers. But this, and all such monstrous fabricks, served only for show and ostentation, being rendered by their vast bulk unwieldy and unfit for service. Athenæus informs us, the common names they were known by, were Cyclades, or *Ætna*, i. e. islands or mountains, to which they seemed nearly equal in bigness; consisting, as some report, of as many materials as would have composed fifty triremes, or ships of three banks.

Three principal articles contain the whole of naval architecture. 1. To give the ship such a figure, or outward form, as may be most suitable to the service for which she is intended. 2. To find the exact shape of all the pieces of timber necessary to compose such a fabrick. 3. To make convenient apartments for the artillery, ammunition, provisions and cargo, together with suitable accommodations for the officers and men.

A ship should be duly poised, so as not to dive or pitch heavily, but go smooth and easy through the water,



water, rising to the waves when they run high, and the ship has reduced her sail to the storm : otherwise they will break aboard and strain the decks, or carry away the boats : the masts are likewise in great danger from the same cause.—It should sail well when large and before the wind, but chiefly close hauled, or with a side wind, and her sails sharp trimmed, and then not fall off to the leeward.

But as there are so many particular services for which vessels are built, and every one has some excellence peculiar to itself ; the whole art is to form the body in such a manner, that none of these qualities shall be entirely destroyed, and in giving the preference to that which is chiefly required in the particular service for which the vessel is built ; but as it would protract the article to a very extraordinary length, to illustrate this point in every circumstance, we shall only observe, that it is possible so to unite them all in one vessel, that each of them may be easily discerned. When it happens otherwise, the fault must lie in the builder, who has not applied himself to study the fundamental rules and principles of his art.

Some ancient artificers possessed of a natural genius, and a few of the moderns who have been instructed in the principles of geometry, and have laboured hard to make a progress in ship building, excepted, we may venture to assert that the greatest number satisfy themselves with copying ships that are esteemed good sailors ; and a tenacious imitation of the servile mechanical methods, which are too common, have, to the great reproach of the art, produced all the pretended rules of proportion ; for the various models they have hitherto used, prove beyond dispute that they have not yet found a proper standard : the only reason why they have tried so many different methods, is, because they could not find the best ; yet every ship builder confines these mechanical rules of describing the midship-frame, and forming the rest of the timbers, to his own fancy, and concealing it from the inferior artificers, who may be possessed of a genius and taste greatly superior to his own ; but we would inform the gentlemen that this is ever regarded by the polite world as a certain characteristic of a narrow and vulgar education, a sordid and illiberal disposition, and a perverse and crooked taste !

For it was never known, that a great architect ever endeavoured to conceal the proportions of the different orders of architecture ? Do we not see every where systems of that noble art published ; plans, elevations, and sections, presented to the general observation of mankind for their approbation or censure ?

But although the methods of describing the midship-frame, and forming the rest of the timbers should be known to most of our younger artificers, yet we have but few good master builders ; this requires a greater portion of genius, than the mere mechanical methods. They should, at least, have a sufficient acquaintance with the mathematicks, physicks, mechanicks, and the nature of solids and fluids, to be able to discover what figure would procure some good quality, without hazarding the putting a bad one in the place.

*Counterfeit ARCHITECTURE*, that which consists of projectures, painted in black or white, or in colours after the manner of marble, which is also called scenework, in the painting of columns, &c. for the decoration of theatres.

*ARCHITECTURE*, in perspective, a sort of building, the members of which are of different modules, and diminish proportionably to their distance, in order to make the work appear longer to the view than it really is.

*ARCHITHALASSUS*, in conchyliology, the name of a very beautiful shell. See *ADMIRAL*.

*ARCHITRAVE*, in architecture, that part of a column, or order of columns, which lies immediately upon the capital ; being the lowest member of the entablature, and so called from its representing the principal beam in timber buildings. When over a chimney it is called the mantle-piece, and over doors or windows, the hyperthyron.

*ARCHIVAULT*, in architecture, the inner centre of an arch, or a band adorned with mouldings running

over the faces of the arch-stones, and bearing upon the imposts. It has only a single face in the Tuscan order, two faces crowned in the Doric and Ionic, and the same mouldings with the architrave in the Corinthian and Composite.

*ARCHIVE*, or *ARCHIVES*, an apartment in which are deposited the records, charters, and other papers of a state community. The archives of the court of Chancery are in the Rolls-office.

*ARCHMARSHAL*, the grand marshal of the empire, a dignity belonging to the elector of Saxony.

*ARCHON*, in Grecian antiquity, the chief magistrate of Athens, after the abolishing of monarchy ; and also, the appellation given to several officers, both civil and religious, under the Greek empire. Thus we read of the archon of the gospel, the archon of the walls, &c.

*ARCHONTICI*, in church history, a branch of Valentinians, who maintained that the world was not created by God, but by angels called archontes.

*ARCHTREASURER*, the great treasurer of the German empire, a dignity belonging to the duke of Brunswick, king of Great-Britain, but also claimed by the elector Palatine.

*ARCILEUTO*, in the Italian musick, a lute longer and larger than ordinary.

*ARCTICK*, *αρκτικος*, in astronomy an epithet given to the north pole, and likewise to a circle of the sphere, parallel to the equator, and twenty-three degrees thirty minutes distant from the north pole.

*ARCTOPHYLAX*, a constellation, otherwise called boötes. See *BOÖTES*.

*ARCTOTIS*, in botany, a genus of plants otherwise called arctotheca and anemospermus. It is one of the *singenesia polygamia* of Linnæus, with a radiated flower.

*ARCTURUS*, a fixed star of the first magnitude, in the skirt of the boötes. The word is from *αρκτος*, bear ; and *ουρα*, tail ; *q. d.* bear's tail ; as being very near it.

*ARCTUS*, in astronomy, the Greek name for the ura major and minor. See the article *URSA*.

*ARCUATION*, in gardening, the method of raising trees by layers, which is done in the following manner :

Strong mother plants or stools must be planted in a clear border, and a straight line, about six feet asunder. When these have shot five or six main branches from the root, and as many collateral branches, the former must be bent to the ground, and there fastened. The small branches must be covered three inches deep upon the joints, and have a large basin of earth made round them to hold the water.

About the middle of September they may be opened, and if they have taken root may be immediately removed into the nursery ; but if they have not sufficiently extended their roots, they must be suffered to remain till the spring, and then transplanted.

*ARCUATION*, in surgery, denotes a distortion or incurvation of the bones, as happens in the rickets, &c.

*ARCUTIO*, a machine formed of a board covered with hoops, used at Florence by nurses, to prevent the child from being overlaid. Every nurse is obliged to lay her child in an arcutio, under pain of excommunication.

*ARDASSES*, the coarsest of all the silks in Persia.

*ARDEA*, in natural history, the heron, a genus of long-beaked birds, distinguished from all others by having the middle toe of each foot ferrated or jagged, with a series of scales on the outside.

*ARDENT*, something very hot, as if on fire.

*ARDENT Fever*, a violent burning fever. See *FEVER*.

*ARDENT Spirits*, those distilled from fermented vegetables, and so called from their easily taking fire.

*ARDERS*, in husbandry, denote the fallowings, or plowings of land.

*AREA*, in geometry, denotes the superficial content of any figure. See *TRIANGLE*, *CIRCLE*, &c.

*AREA*, in astronomy, implies the space comprehended



hended between two rays, drawn from the moving body to the centre of force. These areas are exactly proportional to the times of their description.

AREA, among physicians, the same with the alopecia. See ALOPECIA.

ARECA, the fruit of a kind of palm-tree that grows in the East-Indies. The properties ascribed to it, are, that it strengthens the stomach, and carries off every thing that might corrupt the gums.

ARENA, sand, in natural history. See SAND.

ARENA, in Roman antiquity, the place where the gladiators, &c. fought; so called from its being always covered with sand to conceal the blood spilt in the combat from the view of the people.

ARENATION, a kind of dry bath, where the patient sits with his bare feet on hot sand.

AREOLA, among anatomists, the coloured circle surrounding the nipple of the breast.

AREOPAGUS, or ARÆOPAGUS, in antiquity, a sovereign court at Athens, so famous for the justice and impartiality of its decrees, that the gods themselves are said to have submitted their differences to its decision.

ARGEA, or ARGEI, in Roman antiquity, thirty human figures made of rushes, and thrown annually by the priests or vestals into the Tiber, on the day of the ides of May.

AGREMONE, in botany, the thorny Mexican poppy, a genus of plants with rosaceous flowers and an unilocular capsule for its fruit.

ARGENT, in heraldry, the white color in the coats of gentlemen, knights, and baronets; the white in the arms of sovereign princes, being called luna; and that in the arms of the nobility, pearl.

This is expressed, in engraving, by the parts being left plain, without any strokes from the graver.

ARGENTUM, silver. See SILVER.

ARGETENAR, in astronomy, a star of the fourth magnitude, in the curve of the river Eridanus.

ARGILLA, clay, in natural history. See CLAY.

ARGO, in antiquity, the ship or vessel wherein the Argonauts made their expedition to Colchis.

ARGO *Navis*, the ship, in astronomy, a constellation of fixed stars in the southern hemisphere; the number in Ptolemy's catalogue is 8, in Tycho's 11, and in Mr. Flamsteed's 25.

ARGONAUTS, in Grecian antiquity, a company of illustrious Greeks, who embarked with Jason, in the ship Argo, for Colchis, with a design of obtaining the golden fleece.

ARGUMENT, *Argumentum*, in rhetorick and logick, implies an inference drawn from premises, the truth of which is indisputable, or at least highly probable.

The arguments of orators have particular denominations, according to the topicks whence they are derived: thus we meet with arguments from affection, which interest the passions of the person to whom they are addressed; arguments *ad hominem*, or those drawn from the professed principles of the auditor, &c.

The arguments of logicians are the syllogism, enthymeme, induction, &c. See the article SYLLOGISM, ENTHYME, &c.

ARGUMENT, in astronomy, implies a known arch, by the assistance of which we seek another unknown.

Thus the argument of the moon's latitude is her distance from the node; and the argument of inclination is an arch of a planet's orbit, intercepted between the ascending node, and the place of the planet from the sun, numbered according to the order of the signs.

ARGUMENT also implies the abridgment or heads of a book, chapter, poem, &c.

ARGUMENTATION, the art of forming arguments, or using them with advantage.

ARGUS, in natural history, the name of an uncommon serpent found in Guinea, and so called from the tail, resembling eyes.

ARGUS, a species of the porcelain-shell, beautifully variegated with spots, resembling in some measure those in a peacock's tail.

ARIANS, in ecclesiastical history, a sect of heretics, who followed the opinions of Arius, a presbyter

of Alexandria, in the time of the patriarch Alexander. He broached his heresy in the beginning of the fourth century. And in the year 336, while disburthening himself of the necessities of nature, he voided his bowels, and with them his life.

The Arians denied the three persons in the Holy Trinity to be of the same substance; asserted that there was a time when the Son was not; that he was created in time, mutable in nature; and, like the angels, liable to sin; and, that being united to human flesh, he supplied the place of a human soul, and consequently was subject to sufferings and pain. In their doxologies they ascribed "Glory to the Father, through the Son, and in the Holy Ghost."

ARIANISM, the doctrine or tenets of the Arians.

ARIDED, in astronomy, a fixed star of the second magnitude, in the Swan's tail.

ARIDAS, a kind of taffety manufactured in the East Indies from a shining thread drawn from certain plants; and hence they are stiled aridas, or herbs.

ARIES, in astronomy, a constellation in the heavens represented by a ram, and which is the first sign of the zodiack. (*Plate IV. fig. 1.*) The number of stars in this constellation, are 18 in Ptolemy's catalogue, 21 in Tycho's, and 65 in Mr. Flamsteed's.

ARISTA, among botanists, a long needle-like beard, which stands out from the husk of a grain of corn, grass, &c. it is also called awn.

ARISTOCRACY, a form of government where the supreme authority is lodged in the principal persons of the state, either on account of their nobility, their capacity, or their probity.

ARISTOLOCHIA, birthwort, in botany. See the article BIRTHWORT.

ARISTOTELIAN, something relating to the philosopher Aristotle.

ARISTOTELIAN *Philosophy*, the philosophy of Aristotle, sometimes called the peripatetick philosophy.

The philosopher, from whom the denomination arises, was the son of Nicomachus, physician of Amyntas, king of Macedonia, born in the year of the world 3566; before Christ, 348; at Stagira, a town of Macedonia; or as others say, of Thrace; whence he is also called the Stagyrite.

At seventeen years of age he entered himself a disciple of Plato, and attended in the academy till the death of that philosopher. Repairing afterwards to the court of king Philip; at his return he found that Xenocrates, during his absence, had put himself at the head of the academick sect; upon which he chose the Lyceum for the scene of his future disputations.

It being his practice to philosophize walking, he got the appellation, Peripateticus; whence his followers were also called peripateticks. Though others will have him to have been thus named, from his attending on Alexander at his recovery from an illness, and discoursing with him as he walked about.

Aristotle was a person of admirable genius, and of great and various learning. Averrhoes makes no scruple to call him, "The genius of nature, the limit of human understanding;" and declares him "sent by Providence to teach us all that may be known." He is accused of a too immoderate desire of fame, which led him to destroy the writings of all the philosophers before him, that he might stand singly, and without competitors. And hence, in the schools, Aristotle is called, The philosopher. Laertius, in his life of Aristotle, enumerates his books to the number of 4000; of which scarce above 20 have survived to our age.

This great philosopher has been deified by some, and despised by others; but a short view of his works will abundantly convince us, that both these extremes are ill founded. His first essays were on oratory, and poetry; which, in all probability, he composed for the use of his royal pupil, Alexander the Great. These books are master-pieces; and his study of Homer gave him so finished a taste in poetry and rhetorick, that whoever would now speak or write elegantly on those subjects, must observe his precepts; and, perhaps, these performances do most honor to his memory.

ARISTO-



ARISTOTELIAN *Wheel, rota Aristotelica*. See the article *ROTA*.

ARITHMETICK, is a science which explains the properties of numbers, and shews the method or art of computing them.

We have very little intelligence about the origin and invention of arithmetick; but probably it must have taken its rise from the introduction of commerce, and consequently be of Tyrian invention. From Asia it passed into Egypt, where it was greatly cultivated. From thence it was transmitted to the Greeks, who conveyed it to the Romans with additional improvements. But, from some treatises of the ancients remaining on this subject, it appears that their arithmetick was much inferior to that of the moderns.

NUMBER, which is the object of arithmetick, is that which answers directly to the question, How many? and is either an unit, or some part or parts of an unit, or a multitude of units.

To a person having the idea of number in his mind, the following questions naturally occur, viz. 1. How is such a number to be expressed or written? Hence we have Notation, 2. What is the sum of two or more numbers? Hence Addition. 3. What is the difference of two given numbers? Hence Subtraction. 4. What will be the result or product of a given number repeated or taken a certain number of times? Hence Multiplication. 5. How often is one given number contained in another? Hence Division.

These five, which see, viz. Notation, Addition, Subtraction, Multiplication and the table, and Division, are the chief parts, or rather the whole of arithmetick; as every arithmetical operation requires the use of some of them, and nothing but a proper mixture of them is necessary in any operation whatever; and, by an Arabick term, these are called the *algorithm*.

*Logarithmetical* ARITHMETICK, is that which is performed by tables of logarithms; which are artificial numbers in arithmetical progression, which express the ratios of natural numbers in geometrical progression. See *LOGARITHMS*.

*Decimal* ARITHMETICK, is a very compendious method of performing many calculations in practical arithmetick, especially in interest, annuities, &c. See *DECIMAL FRACTIONS*.

*Dyadic* or *Bynary* ARITHMETICK, is that wherein only two figures, viz. unity, or 1, and 0, are used. See the article *BINARY*.

*Political* ARITHMETICK, is the application of arithmetick to political subjects. See *POLITICAL Arithmetick*.

ARITHMETICK of *Infinities*, is the method of summing up a series of numbers consisting of infinite terms. See the article *SERIES*.

ARITHMETICK of *Irrationals and Surds*. See the article *SURDS*, &c.

*Universal* ARITHMETICK, a name given by Sir Isaac Newton to Algebra, or the calculation of quantities in general. Nor did that great man, whose elevated genius and profound penetration seem to have traced all the sciences to their true metaphysical principles, give it this title without sufficient reason. Common arithmetick has two kinds of principles.

The first are general rules, independent of the characters made use of to express numbers; the second are rules which depend upon these characters, and are properly called rules of arithmetick. The former contain only the general properties of proportions, and take place universally, be these proportions stated how they will. Hence it follows, that by noting numbers by general expressions, though they do not denote one number more than another, we may form certain rules relative to operations, which may be performed by numbers so expressed.

These rules shew the result of one or more operations performed by numbers expressed in a general manner, and in the most simple method; and this result is properly nothing more than an arithmetical operation, expressed in characters, which will vary according to the different arithmetical values we assign the quan-

ties substituted for numbers. This will be set in a clearer light, by taking a cursory view of the four common rules of arithmetick.

Addition consists in adding any numbers proposed into one total, without any other operation. If, for example, it were required to add two dissimilar quantities together, as  $a$  and  $b$ , we set them down simply,  $a + b$ , the result of which is nothing more than an indication, that if  $a$  represents a certain number, and  $b$  another, these numbers must be added together. The expression  $a + b$  is therefore nothing more than an indication of an arithmetical addition, the sum of which will be different, according to the different arithmetical values assigned to  $a$  and  $b$ . Suppose it were required to add  $5a$  to  $3a$ , we may write  $5a + 3a$ ; but it is plain that this may be expressed in a more simple manner; viz.  $8a$ ; and consequently the arithmetical operation should be expressed in that manner: so that addition in algebra expresses the sum or aggregate of several numbers, generally in the most simple manner, and saves the arithmetician a great deal of labour.

In subtraction the case is the same; for if it be required to subtract  $b$  from  $a$ , we write  $a - b$ ; because it is impossible to express this operation in a more simple manner: but should it be required to subtract  $3a$  from  $5a$  it would be improper to write  $5a - 3a$ ; because, if  $a$  had any numerical value, it would occasion the trouble of several arithmetical operations; but simply  $2a$ , which is more convenient in calculation.

It is the same in multiplication and division. If we would multiply  $a + b$ , by  $c + d$ , we might write indifferently  $a + b \times c + d$ , or  $ac + bc + ad + bd$ ; though the first method seems the more proper, because it requires fewer arithmetical operations: in the former there are only two additions and one multiplication necessary; in the latter, three additions and four multiplications. But if it should be required to multiply  $5a$  by  $3a$ , we should write  $15a$ , and not  $5a \times 3a$ ; because the first has only two arithmetical operations, and the second three. In the same manner, to multiply  $a + b$  by  $a - b$ , we should write  $aa - bb$ ; because this result would be more commodious than  $aa + ab - ab - bb$ , and at the same time furnishes a useful theorem, namely, that the product resulting from the sum of the two numbers, multiplied by the difference of the same numbers, is equal to the difference of their squares.

In division, instead of writing  $\frac{20ab}{5b}$ , we should set down simply  $4a$ ; but to express the division of  $ab$  by  $cd$ , we must write  $\frac{ab}{cd}$ ; because a more simple expression cannot be found.

Hence we see that it is with the utmost propriety, that algebra is called universal arithmetick by Sir Isaac Newton; for it exhibits all the general and common rules of every kind of arithmetick, in a manner the most clear, simple, and concise, that can be imagined.

ARITHMETICAL, something belonging to, or performed by arithmetick.

ARITHMETICAL *Complement of a Logarithm, Sine, Tangent, &c.* the sum or number which a logarithm, &c. wants of 10,000,000.

ARITHMETICAL *Mean, or Medium*. See the article *MEDIUM*.

ARITHMETICAL *Progression*. See the article *PROGRESSION*.

ARITHMOMANCY, a species of divination performed by means of numbers.

ARK, or *Noah's ARK*, a floating vessel built by Noah, for the preservation of his family, and the several species of animals, during the deluge.

The ark has afforded several points of curious inquiry among the critics and naturalists, relating to its form, capacity, materials, &c.

The wood whereof the ark was built, is called in the Hebrew *Gopher-wood*, and in the Septuagint, *Square timbers*. Some translate the original *cedar*, others *pine*, others *box*, &c.



Pelletier prefers cedar, on account of its incorruptibility, and the great plenty of it in Asia; whence Herodotus and Theophrastus relate, that the kings of Egypt and Syria built whole fleets thereof, instead of deal.

The learned Mr. Fuller in his Miscellanies, has observed, that the wood whereof the ark was built, was nothing else but that which the Greek call *κυπαρισσος*, or the *cypress-tree*; for, taking away the termination, *kupar* and *gopher* differ very little in sound. This observation the great Bochart has confirmed, and shewn very plainly that no country abounds so much with this wood as that part of Assyria which lies about Babylon.

In what place Noah built and finished his ark is no less made a matter of disputation. But the most probable opinion is, that it was built in Chaldea, in the territories of Babylon, where there was so great a quantity of cypress in the groves and gardens in Alexander's time, that that prince built a whole fleet out of it, for want of timber. And this conjecture is confirmed by the Chaldean tradition, which makes Xithurus (another name for Noah) set sail from that country.

The dimensions of the ark, as given by Moses, are 300 cubits in length, 50 in breadth, and 30 in height, which some have thought too scanty, considering the number of things it was to contain; and hence an argument has been drawn against the authority of the relation. To solve this difficulty many of the ancient fathers, and the modern critics, have been put to very miserable shifts: But Buteo and Kircher have proved geometrically, that, taking the common cubit of a foot and a half, the ark was abundantly sufficient for all the animals supposed to be lodged in it. Snellius computes the ark to have been above half an acre in area, and father Lamy shews, that it was 110 feet longer than the church of St. Mary at Paris, and 64 feet narrower; and if so, it must have been longer than St. Paul's church in London, from west to east; and broader than that church is high in the inside, and 54 feet of our measure in height; and Dr. Arbuthnot computes it to have been 81062 tons.

The things contained in it were, besides eight persons of Noah's family, one pair of every species of unclean animals, and seven pair of every species of clean animals, with provisions for them all during the whole year. The former appears, at first view, almost infinite; but if we come to a calculation, the number of species of animals will be found much less than is generally imagined, not amounting to an hundred species of quadrupeds, nor to two hundred of birds; out of which, in this case, are excepted such animals as can live in the water. Zoologists usually reckon but an hundred and seventy species in all; and bishop Wilkins shews that only seventy-two of the quadruped kind needed a place in the ark.

By the description Moses gives of the ark, it appears to have been divided into three stories, each ten cubits, or fifteen feet high; and it is agreed on, as most probable, that the lowest story was for the beasts, the middle for the food, and the upper for the birds, with Noah and his family; each story being subdivided into different apartments, stalls, &c. Though Josephus Philo, and other commentators, add a kind of fourth story under all the rest; being, as it were, the hold of the vessel, to contain the ballast, and receive the filth and fæces of so many animals: But F. Calmet thinks, that what is here reckoned a story, was no more than what is called the *keel* of ships, and served only for a conservatory of fresh water. Drexelius makes three hundred apartments. F. Fournier, three hundred and thirty-three; the anonymous author of the Questions on Genesis, four hundred; Buteo, Temporarius, Arias Montanus, Hostus, Wilkins, Lamy, and others, suppose as many partitions as there were different sorts of animals. Pelletier makes only seventy-two, viz. thirty-six for the birds, and as many for the beasts; his reason is, that if we suppose a greater number, as 333, or 400, each of the eight persons in the ark must have had thirty-seven,

forty-one, or fifty stalls to attend and cleanse daily, which he thinks impossible to have been done. But it is observed, that there is not much in this; to diminish the number of stalls without a diminution of animals is vain; it being perhaps more difficult to take care of three hundred animals in seventy-two stalls, than in three hundred. As to the number of animals contained in the ark, Buteo computes that it could not be equal to five hundred horses; he even reduces the whole to the dimensions of fifty-six pair of oxen. F. Lamy enlarges it to sixty-four pair of oxen, or an hundred and twenty-eight oxen; so that supposing one ox equal to two horses, if the ark had room for two hundred and fifty-six horses, there must have been room for all the animals. But the same author demonstrates, that one floor of it would suffice for five hundred horses, allowing nine square feet to a horse.

As to the food in the second story, it is observed by Buteo from Columella, that thirty or forty pounds of hay ordinarily suffices for an ox a day, and that a solid cubit of hay, as usually pressed down in our hayricks, weighs about forty pounds; so that a square cubit of hay is more than enough for one ox in one day. Now it appears that the second story contained 150,000 solid cubits, which divided between two hundred and six oxen, will afford each more hay by two thirds, than he can eat in a year. Bishop Wilkins computes all the carnivorous animals, equivalent, as to the bulk of their bodies, and their food, to twenty-seven wolves; and all the rest to two hundred and eighty bees. For the former he allows 1825 sheep, and for the latter, 109,500 cubits of hay, all which will be easily contained in the two first stories and a deal of room to spare. As to the third story no body doubts of its being sufficient for the fowls; with Noah, his sons, and daughters. Upon the whole, the learned bishop remarks, that of the two, it appears much more difficult to assign a number and bulk of necessary things to answer the capacity of the ark, than to find sufficient room for the several species of animals already known to have been there. This he attributes to the imperfection of our list of animals, especially those of the unknown parts of the earth; adding, that the most expert mathematician at this day could not assign the proportion of a vessel better accommodated to the purpose than is here done; and hence finally concludes, that the capacity of the ark, which had been made an objection against scripture, ought to be esteemed a confirmation of its divine authority, since, in those ruder ages, men, being less versed in arts and philosophy, were more obnoxious to vulgar prejudices than now; so that had it been an human invention, it would have been contrived, according to those wild apprehensions which arise from a confused and general view of things, as much too big, as it had been represented too little.

But it must be observed, that besides the places requisite for the beasts and birds, and their provisions, there was room required for Noah to lock up household utensils, the instruments of husbandry, grains and feeds, to sow the earth with after the deluge; for which purpose it is thought that he might spare room in the third story for six and thirty cabins, besides a kitchen, a hall, four chambers, and a space about eight and forty cubits in length to walk in.

*ARK of the covenant*, a small chest or coffer, three feet nine inches in length, two feet three inches in breadth, and two feet three inches in height, in which were contained the golden pot that had manna, and Aaron's rod, and the tables of the covenant.

*ARM, Brachium*, a part of the human body, beginning in the shoulder and terminating in the hand. Among physicians and anatomists, *Arm* only includes that part between the shoulder and the elbow; the rest, from the elbow to the wrist, being taken into the greater hand; by others called the *fore arm*.

The arm in this latter acceptation, has only one large bone, called the humerus, or shoulder-bone. The other part consists of the cubitus or ulna, and the radius, called foetus.



**ARM**, in the manage, is applied to a horse, when he endeavours to defend himself against the bit, by pressing down his head, and bending his neck, to prevent obeying, or being checked by the bit.

**ARM** is also used in geography for a branch of the sea, running some distance into the land.

**ARM** of a magnet is a small piece of steel in the iron inclosure, in which the load-stone is placed.

**ARMADA**, a Spanish term, and denotes a fleet of men of war, as *armadilla* does a squadron. The armada, which attempted to invade England in the time of queen Elizabeth, is famous in history. It was vainly and untruly called "The Invincible Armada."

**ARMADILLO**, in natural history, the name of an animal resembling a hedge-hog, and almost of the same size. His head, body, and tail, are covered with a shield of a bony substance, and very curiously contrived with most beautiful scales.

**ARMED**, in a general sense signifies something provided with, or bearing arms.

**ARMED**, in the sea language. A ship is said to be armed, when fitted out, and provided, in all respects, for war. Also a cross-bar shot is said to be armed, when some rope-yarn, or the like, is rolled about the end of the iron bar, which runneth through the shot, both that the shot may be the better rammed down into the gun, and lest the sharp end of the bar should catch into any honey-combs within the cylinder of the piece.

**ARMED**, in heraldry, is used when the horns, feet, beak, or talons of any beast or bird of prey are of a different colour from the rest of their body.

**ARMED Magnet**, or *Loadstone*. See **MAGNET**.

**ARMENIANS**, in ecclesiastical history, a sect or division among the eastern Christians; thus called from Armenia, the country anciently inhabited by them: there are two kinds of Armenians, the one catholic, and subject to the pope, having a patriarch in Persia, and another in Poland; the other makes a peculiar sect, having two patriarchs in Natolia. They are generally accused of being monophysites, only allowing of one nature in Jesus Christ. As to the eucharist, they, for the most part, agree with the Greeks: they abstain rigorously from eating blood, and meats strangled; and are much addicted to fasting; insomuch that, to hear them talk, one would conclude that almost their whole religion consisted in fasting or abstinence.

**ARMILLA-MEMBROSA**, in anatomy, is that circular ligament which comprehends all the tendons belonging to the whole hand within a circle, in the region of the carpus.

**ARMILLARY**, from the Latin *armilla*, a bracelet, and signifies any thing composed of rings, or circles, resembling a bracelet.

**ARMILLARY Sphere**, an artificial sphere, composed of a number of circles of the mundane sphere, put together in their natural order, to ease and assist the imagination, in conceiving the constitution of the heavens, and the motions of the celestial bodies. (See *plate VI. fig. 2.*)

The armillary sphere revolves upon its axis within a silvered horizon, which is divided into degrees, and moveable every way, upon a brass supporter. The other parts are the equinoctial, zodiack, meridian, the two tropicks, and the two polar circles.

**ARMILUSTRIUM**, in Roman antiquity, a feast held among the Romans; in which they sacrificed armed at all points, and with the sound of trumpets.

**ARMINIANS**, in ecclesiastical history, are a sect of Christians that arose in Holland, by a separation from the Calvinists.

They are great assertors of free-will; and speak very ambiguously of the prescience of God. They look on the doctrine of the Trinity as a point not necessary to salvation, and many of them hold that there is no precept in Scripture which enjoins us to adore the Holy Ghost; and that the Son is not equal to the Father.

**ARMISTICE**, a short truce, or cessation of arms for a small time.

**ARMOISIN**, a silk stuff, or kind of taffety, manufactured in the East-Indies, at Lyons in France,

and Lucca in Italy. That of the Indies is lighter than those made in Europe.

**ARMONIACK**, or **AMMONIACK**, in natural history, a volatile salt, of which there are two kinds, ancient and modern.

**ARMORIAL**, something relating to arms, or coats of arms.

**ARMORY**, a magazine of arms, or a place where military habiliments are deposited, that they may be ready for use.

**ARMORY**, also implies a branch of the science of heraldry, consisting in the knowledge of coats of arms, as to their blazons and various intendments.

**ARMOUR** denotes all such habiliments as serve to defend the body from wounds, especially of darts, a sword, a lance, &c. A complete suit of armour formerly consisted of a helmet, a shield, a cuirasse, a coat of mail, a gantlet, &c. all now laid aside.

**ARMOURER**, a person who makes or deals in arms or armour.

**ARMS**, *Arma*, in a general sense; all kinds of weapons, whether offensive or defensive.

**ARMS**, in a legal sense, extend to any thing a person wears for his own defence, or takes in his hand, and uses in anger, to strike or throw at another.

**ARMS**, or **ARMORIES**, in heraldry, signify marks of honor borne upon shields, banners, and coats, in order to distinguish kingdoms, states, families and persons.

*Charged ARMS* are such as retain their ancient integrity, with the addition of some new honourable bearing.

*Canting*, or *Vocal ARMS*, those in which there are some figures, alluding to the name of the family.

*Full* or *Intire ARMS*, such as retain their primitive purity, without any alterations or abatements.

*False ARMS*, such as are not conformable to the rules of heraldry.

**ARMS**, in falconry, imply the legs of a hawk from the thigh to the foot.

**ARMY**, a large number of soldiers, consisting of horse and foot, completely armed, and provided with artillery, ammunition, &c. under the command of one general, with proper officers under him.

An army is composed of squadrons and battalions, and is usually divided into three corps, and formed into three lines. The first is called the van-guard, the second the main-body, and the third the rear-guard.

**ARNOLDISTS**, in church history, sectaries so called from their leader Arnold of Breffe, who was a great declaimer against the wealth and vices of the clergy; and who is also charged with preaching against baptism, and the eucharist.

**AROLEC**, an American weight, equal to twenty-five of our pounds.

**AROMA**, *philosophorum*, denotes either saffron, or the aroph of Paracelsus; as *aroma germanicum* denotes elecampane.

**AROMATICK**, a name given to such plants as yield a brisk fragrant smell, and a warm taste, as all kinds of spices, &c.

**AROMATICK Wine**, that in which aromatics have been infused.

**AROPH**, a term used by Paracelsus for lithontrip-tick medicines.

**ARORNOS**, a name given by some to juniper.

**AROURA**, a Grecian long measure, containing fifty feet. It was also frequently used for a square measure of half the plethron. The Egyptian aroura was the square of an hundred cubits.

**ARPENT**, a term used sometimes to denote an acre.

**ARRACK**, or **RACK**, a spirituous liquor made by the Tartars of Tongusia. It is also a spirituous liquor which the English get from Batavia or Malacca, of which there are three sorts, the one being extracted from the cocoa-tree, the second from rice, and the third from sugar: but the first is the best and most in use.

**ARRAIGNMENT**, in law, the arraignment or setting a thing in order, as a person is said to arraign a writ



a writ of novel disseisin, who prepares and fits it for trial. It is most properly used to call a person to answer in form of law upon an indictment, &c.

ARRAY, in law, implies the ranking or setting forth a jury or inquest of men impanelled on some cause.

Battle ARRAY, the order or disposition of an army drawn up with a view to engage the enemy.

When an army is drawn up in order of battle, the horse are placed at five feet distant from each other, and the foot at three. In each line the battallions are distant from each other one hundred and eighty feet, which is nearly equal to the extent of their front; and the same holds of the squadrons, which are about three hundred feet distant, the extent of their own front. These intervals are left for the squadrons and battallions of the second line to range themselves against the intervals of the first, that both may more readily march through those spaces to the enemy; the first line is usually three hundred feet distant from the second, and the second the same from the third, that there may be sufficient room to rally, when the squadrons and battallions are broken.

This is to be understood of a land army only. A naval or sea army is a number of ships of war, equipped and manned with sailors and mariners, under the command of an admiral, with other officers under him.

ARREARS, the remainder of a sum due, or money remaining in the hands of an accountant. It likewise signifies the money due for rent, wages, &c. or what remains unpaid of pensions, taxes, &c.

ARRENTATION, in the forest law, implies the licensing an owner of lands in the forest to inclose them with a hedge, and a little ditch, under consideration of a certain rent annually.

ARREST, the apprehending and seizing a person, in order to oblige him to be obedient to the law; which in all cases, except treason, felony, or breach of the peace, must be done by virtue of a precept out of some court.

ARREST of Judgment, the assigning just reasons why judgment should not pass.

ARRESTS, in farriery, mangy humours between the ham and pasterns of a horse's legs.

ARRONDEE, in heraldry. A cross, the arms of which are composed of sections of a circle opposite to each other, so as to make the arms bulge out thicker in one part than another; but both the sections of each arm lie the same way, so that the arms are every where of the same thickness, and, like the plain cross, all of them terminate at the end of the escutcheon.

ARROW, a missile weapon, barbed and sharp-pointed, designed to be shot or thrown from a bow.

ARROW, among surveyors, implies a small stick from a bow, usually shod with iron, to flick in the ground at the end of the chain.

ARROW-ROOT, in botany, the same with the maranta of authors.

ARSCHIN, in commerce, a long measure used in China to measure stuffs. Four arschins make three yards of London.

ARSELLA, in botany, a name used for argemone.

ARSENICK, a poisonous mineral-preparation, which is either white, red, or yellow; all prepared from the flowers of cobalt.

The white arsenick, which is prepared by subliming these flowers, without any addition, is the basis of the other two; the yellow arsenick being made by subliming ten pounds of the white kind, to which one pound of sulphur has been added; and red arsenick is sublimed from ten pounds of white arsenick, or flowers of cobalt, one pound of sulphur, and six ounces of scoria of copper.

Properties and uses of ARSENICK. The smallest quantity of any of these arsenicks, mixed with any metal, renders it friable, and absolutely destroys its malleability; so that the refiners dread nothing so much as arsenick in their metals. It preys more readily on iron, than on copper; both which it turns white.

Silver, and even gold, are not able to withstand the corrosive power of arsenick; but tin suffers most of all from it, being thereby calcined in an instant, to grey loose ashes. It is used in many manufactures. Potters, glass-men, painters in enamel, &c. find it of use in their several professions.

Arsenick, taken internally, is the most fatal of all poisons, and therefore people cannot be too cautious in this respect. Hence also appears the extreme danger in selling yellow arsenick instead of orpiment, which is but too frequently done.

ARSENICAL, in a general sense, something belonging to, or partaking of the nature of arsenick.

ARSENICAL MAGNET, a preparation of white arsenick with antimony and sulphur, said to be a gentle caustick.

ARSENOTHELYS, *αρσηνοθηλυσ*, the same with hermaphrodite.

ARSIS and THESIS, in musick. A point is said to move *per arsin* and *thesin*, which rises in one part and falls in another, and *vice versa*.

ARSMART, in botany. See PERSICARIA.

ARSON, in law, the same with house-burning, which is felony at common law, and likewise by statute.

ART, *ars*, a system of rules, serving to facilitate the performance of certain actions. Arts are commonly divided into liberal and mechanical; the former comprehending poetry, painting, sculpture, architecture, &c. and the latter, the whole body of mechanical trades, as carpentry, masonry, turnery, &c. See POETRY, PAINTING, &c.

The great Bacon observes, that the arts which relate to the eye and ear, are accounted most liberal: the others being held in less repute, as approaching nearer to sensuality than magnificence: also, that during the rise of states, the military arts have been found to flourish; when at their heights, the liberal arts; and, when on the decline, the arts of luxury.

ARTEDIA, in botany, a genus of the pentandria digynia class. The involucre is pinnatifid; the floscules of the disk are masculine, and the fruit is rough.

ARTEMISIA, southernwood, in botany, a genus of the syngenesia polygamia superflua class. The receptacle is either naked or a little downy; it has no pappus; the calix is imbricated with roundish scales; and the corolla has no radii. The vulgaris, or mugwort, is used both as a pot-herb and as a medicine; the leaves are principally celebrated as uterine and antihysterick. The leaves of the absinthium are chiefly used as a bitter or stomachick.

ARTERIAL, in anatomy, any thing belonging to, or that performs the office of, an artery.

ARTERIAL Vein, in anatomy, a name given to the pulmonary artery.

ARTERIOTOMY, the opening an artery with design to procure an evacuation of blood.

The word is Greek, *αρτηριотomia*, and compounded of *αρτηρια*, an artery, and *τεμνω*, to cut.

ARTERY, in anatomy, a conical tube or canal, which conveys the blood from the heart to all parts of the body.

An artery is composed of three membranes or coats; the outermost of which appears to be a web of fine blood vessels and nerves, for conveying nourishment to the interior membranes. The next is composed of circular or spiral fibres, of which there are more or fewer, according to the magnitude of the artery. These fibres, being very elastick, contract themselves with some force, when the power ceases by which they have been extended. The third and innermost membrane is of a dense contexture, yet fine and transparent. It serves to keep the blood within its channels, which otherwise would, upon the dilatation of the artery, separate the spiral fibres from one another. The pulse of the arteries consists of two reciprocal motions, like the pulse of the heart, being a systole and a diastole, keeping opposite times; the systole of the one answering to the diastole of the other.

The



Fig. 1.

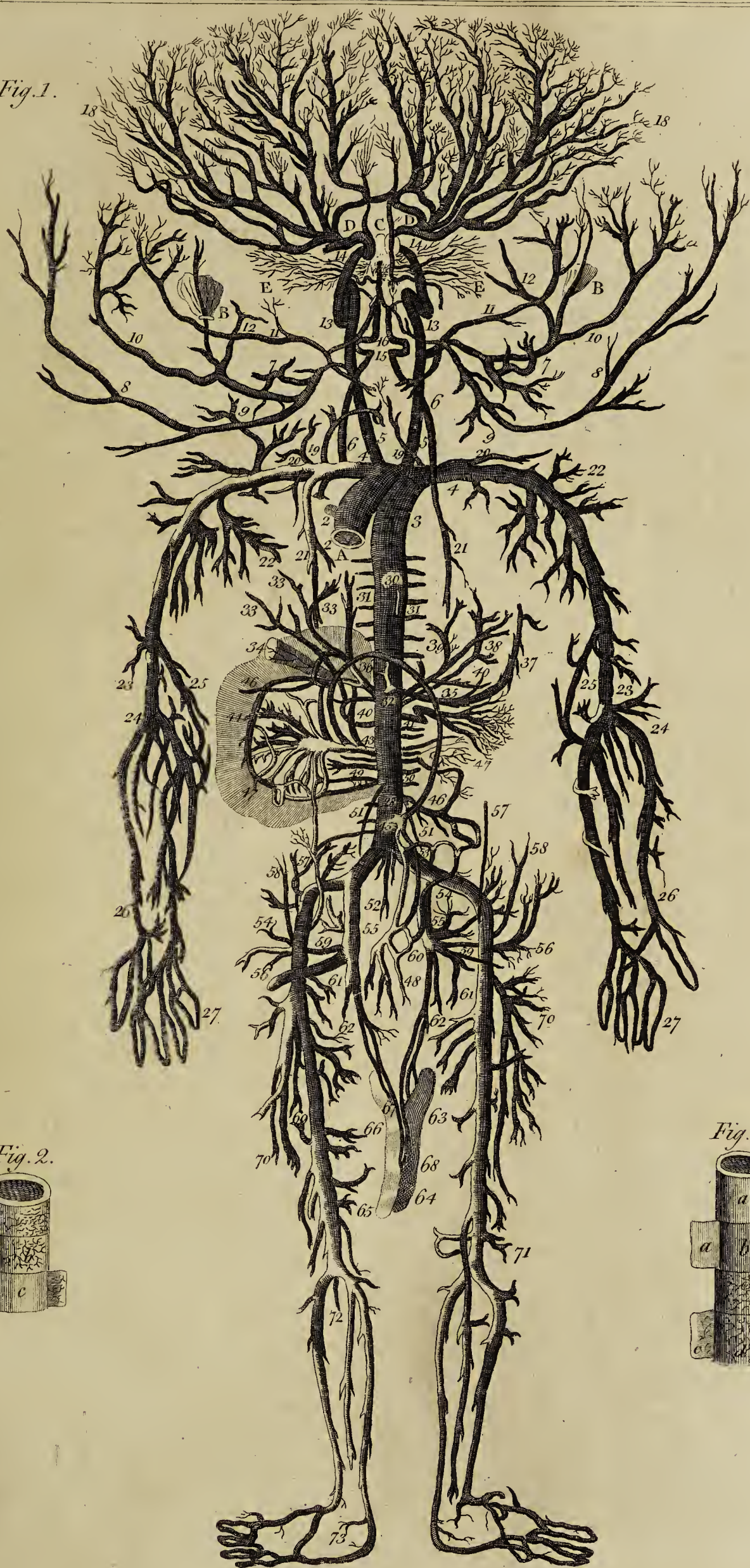


Fig. 2.

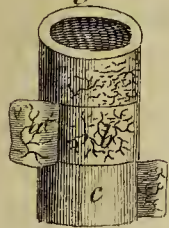
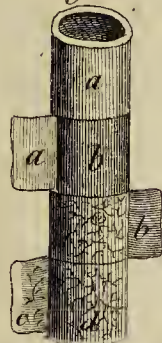


Fig. 3.









The arteries of the human body are, strictly speaking, only two, namely, the aorta, and the pulmonary artery; all the other arteries, though distinguished by proper names, being only branches of these two.

The ascending aorta, which arises immediately from the left ventricle of the heart, presently after gives two arteries, called coronary ones, to the heart itself. A little above this it is divided into three ascending branches, from which are formed the two carotids, and the two subclavians; and from these last proceed the muscularis colli, the external scapular artery, the superior intercostals, the mediastinal artery, the superior diaphragmatic artery, the mammary artery, and the axillary arteries: all which are subdivided into lesser branches.

From the descending trunk of the aorta, proceed in the following order; the bronchial artery, the inferior intercostals, the arteries of the œsophagus, the interior diaphragmatics, the cœliack, superior mesenterick, the renal or emulgent arteries, the sacra, and two iliacks. These are the main branches sent out from the descending aorta, each of which is again subdivided into many lesser branches.

But *fig. 1. plate V.* which is taken from Drake's Anatomy, will give a much better idea of the arteries of the human body, than is possible to be conveyed by words.

1. The aorta cut from its origin at the left ventricle of the heart. *Fig. 3.* of the same plate, represents part of the trunk of the aorta turned inside out; *a, a,* the internal, or nervous coat; *b, b,* the muscular coat; *c,* the external, or vascular coat.

A. The three semi-lunar valves of the aorta, as they appear when they hinder the blood from coming back into the left ventricle of the heart, in its diastole.

2, 2. The trunk of the coronary arteries arising from the aorta.

3. Ligamentum arteriosum.

4, 4. The subclavian arteries.

5, 5. The two carotid arteries.

6, 6. The two vertebral arteries, which arise from the subclavica, and pass through all the transverse processes of the vertebræ of the neck.

7, 7. The arteries which convey blood to the lower part of the face, tongue, adjacent muscles and glands.

8, 8. The trunks of the temporal arteries springing from the carotids, and giving branches to the parotid glands.

9, 9. Branches of the temporal arteries, conveying blood to the neighbouring muscles, the hairy scalp, and forehead.

10, 10. The trunks which send blood to the foramina narium, particularly to the glands of its mucous membrane.

11, 11. The occipital arteries, whose trunks pass close by the mammiform process.

12, 12. Muscles which carry blood to the fauces, gargareon, and muscles of those parts.

B, B. Small portions of the basis of the skull, perforated by the artery of the dura mater, part of which is represented as hanging to the arteries.

13, 13. The contortions of the carotid arteries, before they pass the basis of the skull to the brain.

14, 14. These parts of the carotid arteries, where they pass by each side of the sella turcica, where several small branches arise from them, and help to compose the rete mirabile.

C. The glandula pituitaria, taken out of the sella turcica, lying between the two contorted trunks of the carotid arteries, marked 14, 14.

D, D. The arteriæ ophthalmicæ, which spring from the carotids before they enter the pia mater.

15. The contortions of the vertebral arteries, as they pass the transverse processes of the first vertebræ of the neck, towards the os occipitis.

16. The two trunks of the vertebral arteries that lie on the medulla oblongata.

17. The communicant branches between the carotid and cervical artery.

18, 18. The ramifications of the arteries within the

skull, the larger trunks of which lie between the lobes of the brain, and its fulci.

E, E. The arteries of the cerebellum.

19, 19. The arteries of the larynx; thyroid glands, and adjacent muscles and parts arising from the subclavian arteries.

20, 20. Others arising near the former, which convey blood to the muscles of the neck and scapula.

21, 21. The mammariæ, which arise from the subclavian arteries, and descend on the cartilages of the true ribs internally, on each side the os pectoris or sternum. Some branches of these pass through the pectoral as well as intercostal muscles, and give blood to the breasts, where they meet some branches of the intercostal arteries.

22, 22. The arteries of the muscles of the os humeri, and some of those of the scapula.

23, 23. 24, 24. Those parts of the large trunks of the arteries of the arm, which are liable to be wounded in opening the vena basilica, or innermost of the three veins in the bending of the cubit.

25, 25. A communicant branch of an artery arising from the trunk of the artery of the arm, above its flexure at the cubit, which is anastomosed with the arteries below the cubit.

26, 26. The external artery of the cubit, which makes the pulse near the carpus.

27, 27. Arteries of the hands and fingers.

28, 28. The descending trunk of the arteria magna.

29. The bronchial artery, springing from one of the intercostal arteries: it sometimes arises immediately from the descending trunk of the aorta; and at other times from the superior intercostal artery which springs from the subclavian.

30. A small artery, springing from the fore parts of the aorta descendens, and passing to the gula.

31, 31. The intercostal arteries on each side the arteria magna descendens.

32. The trunk of the arteria cœliaca, whence spring,

33, 33. The hepatic arteries, and

34. The arteria cystica, or the gall-bladder.

35. Arteria coronaria ventriculi inferior.

36. The pylorica.

37. The epiploica dextra, sinistra, and media, springing from the coronaria.

38. The ramifications of the coronary artery, which embrace the bottom of the stomach.

39. Coronaria ventriculi superior.

40, 40. The phrenic arteries, or the two arteries of the diaphragm; that on the left side arising from the trunk of the arteria magna; the right springing from the cœliaca.

41. The trunk of the splenic artery, arising from the cœliaca, contorted.

42. The two small arteries going to the upper part of the duodenum and pancreas; the rest of the arteries of the pancreas spring from the splenic artery in its passage to the spleen.

43. The trunk of the arteria mesenterica superior turned towards the right side.

44. The branches of the superior mesenterick artery, freed from the small guts. Here the various anastomoses the branches of this artery make in the mesentery, before they arrive at the intestines, may be observed.

45. The inferior mesenterick artery, arising from the arteria magna.

46. Remarkable anastomoses of the mesenterick artery with the superior.

47, 47. The branches of the inferior mesenterick artery, as they pass to the intestinum colon.

48. Those of the rectum.

49. The emulgent arteries of the kidneys.

50. The vertebral arteries of the loins.

51, 51. The spermatic arteries, which descend to the testes, and are so small as to escape being filled with wax.

52. Arteria sacra.

53. Arteriæ iliaci.

54, 54. Rami iliaci externi.

55, 55. Iliaci interni.



56, 56. The two umbilical arteries cut off; that on the right side is drawn as in the fœtus, and the left expressed as in an adult.

57, 57. The epigastrick arteries, which ascend under the right muscles of the abdomen, and are inoculated with the mammariæ.

58, 58. Branches of the external iliac arteries, passing between the two oblique muscles of the abdomen.

59, 59. Branches of the internal iliac arteries, which convey the blood to the extensores and obturatores muscles of the thighs.

60. The trunks of the arteries which pass to the penis.

61, 61. The arteries of the bladder.

62, 62. The internal arteries of the pudendum, which, with those here expressed with the penis, make the hypogastrick arteries in women.

63. The penis extended with wax, and dried.

64. The glans penis.

65. The upper part of the dorsum penis, cut from the body of the penis, and raised, to shew the corpora cavernosa penis.

66. Corpora cavernosa penis, freed from the ossa pubis, and tied after inflation.

67. The two arteries of the penis, as they appear injected with wax.

68. The capsula and septum of the corpora cavernosa penis.

69. The crural arteries.

70, 70. The arteries which pass to the muscles of the thighs and tibiae.

71. That part of the crural artery that passes the ham.

72. The three large trunks of the arteries of the legs.

73. The arteries of the foot, with their communicating branch, from their superior to their inferior trunk, as well as their communications at the extremity of each toe, like those of the fingers.

*Rough* ARTERY. See *ASPERA Arteria*.

ARTHRITIS, in medicine, a disease, well known by the appellation of the gout. See the article *GOUT*.

The word is Greek, and derived from *αρθρον*, a joint; because the chief seat of that distemper is in the joints.

ARTHRODIA, in anatomy, a species of articulation, wherein the flat head of one bone is received into a shallow socket in the other. The humerus and scapula are joined by this species of articulation.

The word is Greek, and compounded of *αρθρον*, a joint, and *δεχομαι*, to receive.

ARTHRODIUM, in natural history, a genus of imperfect crystals, always found in complex masses, and forming long single pyramids, with very short and slender columns. See *CRYSTAL*.

ARTICHOKE, *Cynara*, in botany, a well-known plant, cultivated in gardens. It requires a rich, deep, and moist soil, thoroughly dug several times over, and mixed with plenty of well rotted dung, to the depth of at least three feet; for the deeper the mould is, the less watering they will require in the summer, and the larger and better flavored their fruit will be in autumn. They may be raised from seeds: but the usual and most expeditious way of propagating them is by slips, or suckers, taken from the old roots in February or March, or as soon as the hard frosts are over. These suckers should be taken off with some fibres to them; and if they are planted in a well prepared soil, like the above-mentioned, they will yield the next autumn.

ARTICLE, a clause or condition of a contract, treaty, &c. It is also a small part or division of a discourse, a book, or writing, &c.

ARTICLE, in grammar, a particle in most languages that serves to express the several cases and genders of nouns, when the language has not different terminations to denote the different states and circumstances of nouns.

The Greeks have their *ο*; the eastern nations their emphatical *he*; and most of the modern languages have recourse to articles for fixing and ascertaining the vague

signification of common and appellative names. The Latin, having no article, labors under a very great disadvantage. Thus, when the devil said to our Saviour, *Sit tu es filius Dei*, it may be rendered *If thou art a Son of God*, or, *If thou art the Son of God*; and consequently the sense is ambiguous.

The English have only two articles *a*, or *an*, when the substantive begins with a vowel, and *the*, which, being prefixed to substantives, apply their general signification to some particular thing. Thus we say, *a man*, or *the man*; the former confining the general word *man*, to some man or other, and the latter to a particular man.

Hence *a* is called an indefinite, and *the*, a definite article; because the former is applied to nouns, taken in a more general and diffused signification; whereas the latter confines the word to some particular object.

The grammatical appellation proper to be given to the article, is not agreed upon; some will have it to be an adjective, some a pronoun, and others a distinct part of speech; but this is a frivolous dispute, and has no relation to the use of the article.

ARTICULARIS *morbus*. See *GOUT*.

ARTICULATE *sounds*, are certain sounds that express the letters, syllables, or words of any alphabet or language: such are formed by the human voice, and by some few birds, as parrots, &c.

ARTICULATION, in anatomy, denotes the juncture of two bones intended for motion.

ARTIFICER, a person whose employment it is to manufacture any kind of commodity, as in iron, brass, wood, &c. such are smiths, weavers, carpenters, &c.

ARTIFICIAL, in a general sense, denotes something made, fashioned, or produced by art, in contradistinction to the productions of nature.

ARTILLERY, large fire-arms, with their appurtenances, as cannons, mortars, bombs, petards, muskets, carabines, &c.

ARTILLERY-park, the place in the rear of both lines in the army, for encamping the artillery, which is drawn up in lines, of which one is formed by the guns; the ammunition-waggons make two or three lines, sixty paces behind the guns, and thirty distant from one another; the pontoons and tumbrils make the last line. The whole is surrounded with a rope which forms the park; the gunners and mattrasses encamp on the flanks, and the bombardiers, pontoon-men, and artificers, in the rear.

ARTILLERY-train, a certain number of pieces of ordnance, mounted on carriages, with all their furniture fit for marching.

ARTILLERY-company, a band of infantry, consisting of six hundred men, making part of the militia or city-guard of London.

ARTIST, a person skilled in some art.

ARTOTYRITES, in ecclesiastical history, a sect in the primitive church, who used bread and cheese in celebrating the eucharist.

The word is formed from the Greek, *αρτος*, bread, and *τυρος*, cheese. This sect that appeared in the second century, was a branch of the montanists. They admitted women into the priesthood and episcopacy; and Epiphanius tells us, that it was a common thing to see a body of seven girls enter their church, dressed in white, and each carrying a torch in her hand, where they wept and bewailed the wretchedness of human nature, and the miseries of this life.

ARVALES *fratres*, in Roman antiquity, a college of twelve priests instituted by Romulus, who himself made one of the body; they assisted in the sacrifices of the ambervalia, offered annually to Ceres and Bacchus, for the prosperity of the principal fruits of the earth, viz. those of corn and wine.

ARUM, in botany, a genus of the gynandria polyandria class. There are 22 species of arum, only one of which, viz. the maculatum, or water-robin, is a native of Britain. The root of the maculatum is a powerful stimulant and attenuant.

ARUNCUS, in botany, the trivial name of a species of spiræa.

ARUNDO,



**ARUNDO**, in botany, a genus of the triandria digynia class. The calix consists of two valves, and the floscules are thick and downy.

**ARUSPICES**, an order of priesthood among the Romans, that pretended to foretell future events by inspecting the entrails of victims killed in sacrifice; they were also consulted on occasion of portents and prodigies.

**ARYTÆNOIDES**, in anatomy, the name of two cartilages which, together with others, constitute the head of the larynx. It is also applied to some muscles of the larynx.

**ARYTÆNOIDEUS**, in anatomy, one of the muscles that close the larynx.

**ARYTHMUS**, in medicine, the want of a just modulation in the pulse. It is opposed to eurythmus, a pulse modulated agreeably to nature.

**AS**, in antiquity, a particular weight, consisting of twelve ounces, being the same with libra, or the Roman pound. It was also the name of a Roman coin, which was of different matter and weight, according to the different ages of the commonwealth. It is also used to signify an integer, divisible into twelve parts; from which last acceptation is signified a whole inheritance.

**ASAFOETIDA**, in the materia medica, the concrete juice of a large umbelliferous plant growing in Persia. This juice exudes from wounds made in the root of the plant, liquid and white like milk. This drug has a strong foetid smell like garlick, and a bitter, acrid, biting taste. It is frequently used in hysterick and nervous complaints, flatulent cholicks, and as a promoter of the menses. It is likewise an ingredient in the officinal gum-pills, and several other compositions.

**ASA dulcis**. See **BENZOIN**.

**ASAPPES**, or **AZAPES**, in the Turkish armies, a name given to the auxiliary troops which they raise among the Christians under their dominion, and expose to the first shock of the enemy.

**ASARABACCA**, in botany. See **ASARUM**.

**ASARINA**, in botany, a synonyme of the chelone. See **CHELONE**.

**ASARUM**, in botany, a genus of the dodecandria monogynia class. The asarum is quinquefid, and rests on the germen; it has no corolla. The species are four, only one of which, viz. the europæum, is a native of Britain. It is a strong sternutatory, and occasions great evacuations, both upwards and downwards.

**ASBESTOS**, a sort of native fossil stone, which may be split into threads and filaments, from one inch to ten inches in length, very fine, brittle, yet somewhat tractable, silky, and of a greyish color, not unlike talck of Venice. It is almost insipid to the taste, indissoluble in water, and endued with the wonderful property of remaining unconsumed in the fire, which only whitens it. But, notwithstanding the common opinion, in two trials before the Royal Society, a piece of cloth made of this stone was found to lose a dram of its weight each time. Paper as well as cloth has been made of it; and Pliny says he had seen napkins of it, which, being taken foul from the table, were thrown into the fire, and better scoured than if they had been washed in water. This stone is found in many places of Asia and Europe; particularly in the island of Anglesey in Wales, and in Aberdeenshire in Scotland.

**ASCARIS**, in zoology, a genus of insects belonging to the order of vermes intestina. The body of the ascaris is cylindrical, filiform, and tapers at both ends.

**ASCORIDES**, a species of very slender worms, often found in the intestinum rectum, especially of children.

**ASCENDANT**, in astronomy, is a term used for such stars as are rising above the horizon in any parallel of declination. It is also that part of the heavens, or degree of the equinoctial, which is cut by the eastern semicircle of the horizon, at the time of any person's nativity.

**ASCENDING**, in astronomy, is said of such stars as are rising above the horizon in any parallel of the equator.

**ASCENDING vessels**, in anatomy, those which carry the blood upwards, as the aërta ascendens.

**ASCENSION**, in astronomy, is either right or oblique. Right ascension of the sun, or a star, is that degree of the equinoctial, counted from the beginning of aries, which rises with the sun or star in a right sphere. Oblique ascension is an arch of the equator intercepted between the first point of aries, and that point of the equator which rises together with a star in an oblique sphere.

**ASCENSION-day**, a festival of the Christian church, held ten days before Whitsuntide, in memory of our Saviour's ascension into heaven after his resurrection.

**ASCENSIONAL**, in a general sense, something belonging to ascent or ascension.

**ASCENSIONAL difference**, the difference between the right and oblique ascension of the same point to the surface of the sphere.

**ASCENT**, in a general sense, implies the motion of a body upwards.

**ASCENT of Fluids**. See the article **FLUID**.

**ASCENT of Vapours**. See **VAPOUR**.

**ASCETICKS**, in church-history, such Christians in the primitive church as enured themselves to great degrees of abstinence and fasting, in order to subdue their passions.

**ASCII**, among geographers, an appellation given to those inhabitants of the earth who, at certain seasons of the year, have no shadow: such are all the inhabitants of the torrid zone, when the sun is vertical to them.

**ASCITES**, in medicine, the dropsy. See the article **DROPSY**.

**ASCLEPIAD**, in ancient poetry, a verse composed of four feet, the first of which is a spondee, the second a choriambus, and the two last dactyls; or of four feet and a cæsura, the first a spondee, the second a dactyl, after which comes the cæsura, then the two dactyls, as,

*Mæcenæ atavis edite regibus.*

**ASCLEPIAS**, in botany, a genus of the pentandria digynia class. The generic character is taken from five oval, concave, horn-like nectaria, which are found in the flower.

**ASCLEPODOTÆANS**, a sect of hereticks, the followers of Asclepiodotus, who first taught that Christ was a mere man. They appeared in the second century.

**ASCODRUTÆ**, a sect of the gnosticks, who rejected all external worship.

**ASCUS**, in natural history, the pouch or bag of the opossum. See **OPOSSUM**.

**ASCOLIA**, a festival celebrated by the Athenian husbandmen in honor of Bacchus, to whom they sacrificed a he-goat, because that animal destroys the vines.

**ASH**, *Fraxinus*, in botany, a genus of trees, belonging to the polygamia dicæcia class. The calix of the hermaphrodite is divided into four parts; it has no corolla; the stamina are two; and it has but one pistil: the female has one pistil, and one lanceolated seed. There are three species, only one of which, viz. the excelsior or common ash, is a native of Britain.

The wood of this tree is in great use among several artificers, as wheel-wrights, cart-wrights, carpenters, turners, &c. also for making ploughs, harrows, axletrees, oars, balls, &c. It is said to be as lasting for building as oak, and often preferred before it: though the timber of the trunk greatly excels that of a bough.

**ASHES**, the earthy part of wood and other combustibles, remaining after they are consumed by fire. These, if produced from a vegetable, are of a white color and saltish taste, and, when boiled with fair water, yield a lixivium of an acrimonious, alkaline, fiery, urinous taste. The ashes of all vegetables are vitrifiable, and are found to contain iron.

**ASIA**, one of the four grand divisions of the earth, situated between 25 and 148 deg. of east longitude; and between the equator and 72 deg. of north latitude. It is bounded on the north by the Frozen ocean; on the east by the South-sea; on the south by the Indian ocean; and on the west by the Red-sea, Mediterranean, &c. It is about 4800 miles in length, from east to west, and 4300 in breadth, from north to south.

Asia



Asia is divided into three parts, distinguished by the epithets, eastern, western, and middle. The first comprehends the empire of China, Chinese Tartary, and the Asiatic Islands, lying to the south and east of China; the second, or western division, comprehends Persia, Arabia, Astracan, Circassian-Tartary, and Turkey in Asia. The middle comprehends India, Usbec-Tartary, Calmuc-Tartary, and Siberia.

*Lesser Asia*, the same with Natolia. See NATOLIA.

ASPALATH, *aspalathum*, in the materia medica, called also rose-wood, is a wood or rather root, that comes from the Canaries, of a yellowish-color, and hard woody substance, full of knots. It was accounted by the ancients an astringent, but now is almost quite rejected, as an internal medicine. An oil drawn from it is of an admirable scent, and very comfortable to the head, where perfumes are not offensive. It is chiefly used in scenting pomatums and liniments.

ASPARAGUS, in botany, a genus of plants, the flower of which is rosaceous, and its fruit a roundish berry, containing two smooth seeds of the same shape.

The root of this plant is deservedly reckoned one of the five openers, and is an ingredient in all compositions, intended to cleanse the viscera, especially where their obstructions threaten the jaundice and dropsy. It is likewise used in many disorders of the breast, as operating by urine is of service in most such cases.

ASPECT, in astronomy, denotes the situation of the planets and stars, with respect to each other; whereof we find mention of five kinds: 1. Sextile aspect is when the planets or stars are  $60^\circ$  distant, and marked thus  $\ast$ . 2. The quartile, or quadrate, when they are  $90^\circ$  distant, marked  $\square$ . 3. Trine, when  $120^\circ$  distant marked  $\Delta$ . 4. Opposition when  $180^\circ$  distant, marked  $\delta$ . And, 5. Conjunction, when both in the same degree, marked  $\gamma$ .

Kepler, who added eight new ones, defines aspect to be the angle formed by the rays of two stars meeting on the earth, whereby their good or bad influence is measured; for it ought to be observed, that these aspects being first introduced by astrologers, were distinguished into benign, malignant, and indifferent; the quartile and opposition being accounted malign, the trine and sextile, benign or friendly, and the conjunction indifferent.

ASPEN-TREE, in botany, a species of the poplar, with trembling leaves. See POPLAR.

ASPER, in grammar, an accent peculiar to the Greek language, marked thus ( $\acute$ ), and importing, that the letters over which it is placed ought to be strongly aspirated, or pronounced as if an *h* were joined with them.

ASPER, or ASPRE, in commerce, a Turkish coin, three of which make a medine, and worth something more than our half-penny.

ASPERA Arteria, trachea, or wind-pipe, in anatomy, a large canal, partly cartilaginous, and partly membranous, situated anteriorly in the lower part of the neck, whence it runs down into the thorax, between the two pleuræ, through the upper space left between the duplicature of the mediastinum, behind the thymus. Having reached as low as the curvature of the aorta, it divides into two lateral parts, one towards the right hand, the other towards the left, which enter the lungs, and are distributed through them.

These two branches are called bronchia, and that on the right side is shorter than that on the left; whereas the right pulmonary artery is the longest. The trachea is made up of segments of circles, or cartilaginous hoops, disposed in such a manner, as to form a canal open to the back part, the cartilages not going quite round; but this opening is filled by a soft glandular membrane, which completes the circumference of the canal. Each circle is about the twelfth part of an inch in breadth, and about a quarter of that space in thickness; their extremities are round, and they are situated horizontally above each other, small interstices being left between them, and the lower edge of the superior segment being turned toward the upper edge of those next below them. They are all connected by a very

strong elastick membranous ligament, fixed to their edges.

I have observed the first three segments united into one, bent alternately in two different places, according to its breadth: sometimes two are contiguous in the same manner. The canal of the aspera arteria is lined on the inside by a particular membrane, which appears to be partly fleshy, or muscular, and partly ligamentary, perforated by an infinite number of small holes, more or less imperceptible, through which a mucilaginous fluid continually passes, to defend the inner surface of the trachea against the acrimony of the air which we breathe. This fluid comes from glandular bodies, dispersed through the substance of the membrane, but especially from glands something larger than the former, which lie on the outer or posterior surface of that strong membrane, by which the circumference of the canal is completed. The same structure is observable in the ramifications of the trachea, from the greatest to the smallest.

The aspera arteria is, like the arteries of the human body, composed of three tunicks or coats. Plate V. fig. 2. represents these membranes separated from each other; *a*, the glandulous membrane; *b*, the vasculous; *c*, the internal tunick.

ASPERIFOLIATE, or ASPERIFOLIÖUS, among botanists, such plants as are rough-leaved, having their leaves placed alternately on their stalks, and a monopetalous flower divided into five parts.

ASPERUGO, in botany, a genus of the pentandria monogynia class. There are two species, viz. the procumbens, or wild buglos, a native of Britain; and the Ægyptiaca, a native of Egypt.

ASPERULA, in botany, a genus of the tetandria monogynia class. The corolla is infundibuliform, and the capsule contains two globular seeds. There are six species, of which the odorata, or wood-roof, and the cynachica, or squinancy-wort, are natives of Britain.

ASPHALTUM, in natural history, a solid, dark, opaque, inflammable substance, found in Egypt about the Dead Sea, and in many places of Europe, in detached masses of no regular structure, breaking easily in any direction, very light, fusible, and, after burning some time with a greenish white flame, leaving a white residuum of ashes. Dr. Hill enumerates three species of it, the first being the bitumen Judaicum, which is of a discutient quality, promotes the menstrual discharge, and enters as an ingredient into the Venice treacle.

ASPHODELUS, in botany, a genus of the hexandria monogynia class. The calix is divided into six parts; and the nectarium consists of six valves covering the germen. There are three species, viz. the buteus, a native of Sicily; the fistulosus and ramosus, both natives of Spain, &c.

ASPHURELATA, in natural history, are semi-metallick fossils, fusible by fire, and not malleable in their purest state, being in their native state intimately mixed with sulphur and other adventitious matter, and reduced to what are called ores.

Of this series of fossils, there are only five bodies, each of which makes a distinct genus; and these bodies are antimony, bismuth, cobalt, zinc, or quicksilver.

ASPIRATE, in grammar, denotes words marked with the spiritus asper. See ASPER.

ASPIRATION, among grammarians, is used to denote the pronouncing a syllable with some vehemence.

ASPLENIUM, MILT-WASTE, or SPLEEN-WORT, in botany, a genus of cryptogamous plants, the fructification of which is arranged in clusters, and disposed in form of straight lines, under the disk of the leaf.

This genus comprehends the *asplenium*, *lingua cervina*, and *trichomenes* of different botanists.

ASS, *asinus*, in zoology, a quadruped of the horse-kind, with a long head, long ears, a round body covered with a short and coarse fur, of a pale dun color, with a streak of black running down its back, and across the



the shoulders, and a tail not hairy all the way, as in a horse, but only at the end.

The ass is wild in many warm countries, and particularly in Africa.

*ASSES Milk*, the milk of the animal described in the preceding article, and greatly recommended in consumptions and other decays.

*ASSA DULCIS*, &c. See *ASA*.

*ASSARON*, or *OMER*, a measure of capacity, in use among the Hebrews, containing five pints. It was the measure of manna which God appointed for every Israelite.

*ASSART*, *assartum*, in law, an offence committed in a forest, by pulling up the trees by the roots. This is a greater trespass than waste.

A person, however, may sue out a licence to assart ground in a forest; that is, to clear it and make it arable; and from hence lands are called assarted, and formerly assart rents were paid to the crown for such lands.

*ASSASSIN*, a person who kills another by attacking him at some disadvantage. It is also meant of one who hires himself to murder a person to whom he is a stranger, in order to revenge the quarrel of another.

*ASSATION*, a term used in pharmacy, for a peculiar kind of decoction of plants in their own juice.

*ASSAULT*, in law, a violent injury offered to a man's person, being of a higher nature than battery; for it may be committed by offering a blow, or a terrifying speech.

*ASSAULT*, in the military art, a furious effort to carry a fortified post, camp, or fortress, wherein the assailants do not screen themselves by any works: while the assault continues, the batteries cease, for fear of killing their own men.

*ASSAY*, *Essay*, or *SAY*, in metallurgy, the trial of the goodness and purity of metals, and metalline substances.

*ASSAY Oven*, or *Docimaetical Furnace*, a furnace generally used in assaying metals: and is constructed in the following manner.

1. Make with iron plates, a hollow quadrangular prism. H, H, (*plate VI. fig. 4.*) eleven inches broad, and nine inches high, ending at the top in a hollow quadrangular pyramid I, seven inches high, and terminating in an aperture seven inches square. But this prism must be closed at the bottom with an iron plate A, which serves as a basis.

2. Near the bottom make a door A, three inches high, and five inches broad, leading to the ash-hole.

3. Above this, and about six inches from the base, make another door C, forming the segment of a circle, four inches broad at its basis, and three inches and a half high in the middle.

4. Fasten three iron plates H, H, H, on the fore part of the furnace; let the lowermost of these plates, which is eleven inches long, and half an inch broad, be fastened with rivets to the bottom and fore part of the furnace, in such a manner, that there may be a groove so wide, between the upper edge of the said plate and the side of the furnace, that the sliders B, B, of the lower door, may be moved easily backwards and forwards therein, by means of the handles O, O: these sliders must be made of thicker iron plate than the other parts of the furnace. The second iron plate must be also fastened with rivets in the space between the two doors, and directly parallel to the former, in such a number, that both the upper and lower edge of it may form a hollow groove with the side of the furnace. The lower of these grooves serves to receive the upper edges of the sliders B, B, that shut the lower door: the upper groove is to receive the inferior edges of the sliders D, D, belonging to the door C. The third plate, which is like the first, must be riveted close above the upper door, in such a manner, that its lower side may form a groove with the side of the furnace.

5. Make two sliders D, D, to slide in the above grooves, by means of the handles O, O. In these sliders must be two holes near the top; the one, marked E, must be about one fifth of an inch broad, and one inch and a half long; the other, marked F, a circular aperture one inch high, and two inches broad.

VOL. I. No. 9.

6. Let five round holes, one inch diameter, be bored in the furnace, two in the fore part marked G, G, and two in the back part, all at the height of five inches from the bottom, and each of them three inches and a half from the nearest side of the furnace; and a fifth hole K, at the height of one inch above the top of the upper door C.

7. Let the inside of the furnace be furnished with iron hooks, about three inches from each other, and projecting about half an inch, in order to fasten the lute, with which the inside of the furnace must be covered.

8. Let a moveable hollow quadrangular pyramid M, three inches high, be fitted to the upper aperture L, of the furnace; seven inches broad at the base, and terminating at the top in a circular tube N, three inches in diameter, two inches high, and the upper diameter somewhat less than the bottom. This prominent tube serves to support a funnel or flue, fitted to it, and composed of iron plates, two feet high. This funnel is only necessary when a very strong fire is required. The pyramidal cover M, must have two handles P, P, fastened to it, in order to put it on, or take it off, as the operation may require. And to hinder this cover from being easily thrown down, let an iron plate be riveted to the right and left sides of the upper part of the furnace, and turn down towards the inside, so as to form a groove, into which the lateral edges of the cover may enter, and slide forwards and backwards at pleasure.

9. A square ledge of thick iron plate must be fastened to the top of the upper ledge of the lower door A, in order to support the grate and lute. The grate must be composed of small iron bars, half an inch thick, three fourths of an inch distant from each other, and placed edgeways on the ledge. The lute must be about three quarters of an inch thick, and composed of Windfor loam, or French clay, moistened with ox blood diluted with water. In order to perform an operation in this oven, two iron bars an inch thick, and of a proper length, must be thrust through the four holes G, G, above described, in order to support the muffle introduced through the upper aperture of the furnace.

*ASSAYING*, is the art of finding how much pure metal is contained in every ore, or the proportion of the several ingredients of any mixed metal. The former of these, or the assaying the ores of metals, will be delivered under their several articles *GOLD*, *SILVER*, *LEAD*, &c.

*ASSAY-MASTER*, an officer appointed by certain corporations, to make a just assay of all gold and silver brought to him, and to make a true report thereof.

*ASSEMBLAGE*, the uniting, or joining of things together; or the things themselves so united, or joined. It is also used in a more general sense, for a collection of various things so disposed and diversified, as that the whole produces some agreeable effect.

*ASSEMBLY*, the meeting of several persons in the same place, upon the same design.

*ASSEMBLY*, in the military art, the second beating of a drum before a march; at which the soldiers strike their tents, roll them up, and stand to arms.

*ASSEMBLIES*, of the clergy, are called convocations, synods, councils; the annual meeting of the church of Scotland is called a general assembly.

*ASSEMBLIES* of the Roman people were called comitia.

*ASSENT*, *Assensus*, in a general sense, an agreement to something proposed or affirmed.

*Royal Assent*, the approbation given by the king to a bill in parliament, after which it becomes a law.

*ASSESSOR*, an inferior office of justice, appointed chiefly to assist the ordinary judge with his opinion and advice.

*ASSESSOR*, also implies one that assesses or settles taxes or other publick duties.

*ASSIENTO*, a Spanish word signifying a farm, in commerce, is used for a bargain between the king of Spain and other powers, for importing negroes into



the Spanish dominions in America, and particularly to Buenos Ayres.

ASSIGN, in common law, implies a person to whom any thing is assigned or made over.

ASSIGNEE, in law, a person appointed by another to do an act, transact some business, or enjoy some particular commodity.

ASSIGNMENT, the transferring the interest one has in a lease, or other thing, to another person.

ASSISE, implies a court, place, or time, when and where the writs and processes, whether civil or criminal, are decided by judge and jury. In this sense, assise is either general or special; general, when judges go their respective circuits, with commission to take all assise: special, when a commission is granted to particular persons for taking an assise upon one or two disseisins only.

By magna charta, justices shall be sent through every county, once a year, who, with the knights of the several shires, shall take assise of novel disseisin. With regard to the general assise, all the counties of England are divided into six circuits, and two judges are assigned by the king's commission to every circuit, who now hold the assises twice a year, in every county except Middlesex, and the counties palatine. These judges have five several commissions. 1. Of oyer and terminer, by which they are impowered to try treasons, felonies, &c. 2. Of gaol-delivery, which empowers them to try every prisoner in gaol, be his offence what it will. 3. Of assise, which gives them authority to do right upon writs, brought by persons wrongfully thrust out of their lands and possessions. 4. Of nisi prius, by which civil causes come to an issue in the courts of Westminster, are tried in the vacation by a jury of twelve men, in the county where the cause of action arises. 5. A commission of the peace in every county of the circuit: and all justices of the peace and sheriffs are to attend upon the judges, otherwise they are liable to be fined.

ASSISE is also used in several other significations; as 1. For a jury, where assises of novel disseisin are tried, and the pannels of assise shall be arraigned. 2. For a quantity of wheat, bread, &c. prescribed by the statute.

ASSISE of *Mort d'Ancestor*, is a writ which lies where a person's father, mother, brother, &c. died, seized of lands and tenements in fee, and after either of their deaths a stranger abateth.

ASSISE of *Utrum*, lieth for an ecclesiastick against a layman, or a layman against an ecclesiastick, for lands or tenements doubtful whether they be lay-fee, or fee-alms.

ASSOCIATE, a partner, adjunct, fellow, or companion.

ASSOCIATION, the act of associating, constituting or forming a partnership, or society.

ASSOCIATION of *Ideas*, is where two or more ideas constantly and immediately follow one another, so that the one shall almost infallibly produce the other.

When there is a real affinity or connection between ideas, it is the excellence of our reason to have them and hold them together, in that union and correspondence, which is founded in their peculiar beings. But when there is no affinity between them, nor any cause to be assigned for their accompanying each other, but what is owing to mere accident or custom; this natural association becomes a great imperfection, and is, generally speaking, a main cause of error, or wrong deductions in reasoning.

ASSOCIATION, in law, is a writ or patent sent by the king, either of his own motion, or at the suit of the plaintiff, to the judges of assise, to have others associated to them, to take the assise. Upon this patent of association the king sends his writ to the justices of the assise, commanding them to admit these that are so sent.

ASSOILE, in our ancient law-books signifies to absolve, deliver, or set free, from an excommunication.

ASSONANCE, in rhetorick or poetry, is where the words of a phrase or verse have nearly the same sound or termination, but make no proper rhyme:

these are usually accounted vicious in English, though the Romans sometimes used them with elegance.

ASSUMPSIT, in law, a voluntary or verbal promise, whereby a person undertakes to perform some agreement, or pay a certain sum to another. Thus, where a man sells goods to another, the law makes the assumpsit; and promises he shall pay for them.

ASSUMPTION, a festival in the Romish church, celebrated in honor of the miraculous ascension of the Virgin Mary, body and soul, into heaven.

The word is Latin, *assumptio*, and compounded of *ad*, to, and *sumo*, to take.

ASSUMPTION, in logick, is the minor or second proposition in a categorical syllogism.

ASSUMPTION, is also sometimes used to imply a consequence drawn from the propositions which compose an argument.

ASSUMPTIVE *Arms*, in heraldry, are such as a person has a right to assume in consequence of some noble and gallant action.

ASSURANCE, or INSURANCE. See the article INSURANCE.

ASSURITANI, in ecclesiastical history, a sect of hereticks, who made their first appearance in Africa during the reign of Constantius. They were a branch of the Donatists, and held that the Son was inferior to the Father, and the Holy Ghost inferior to the Son: they re-baptized those who embraced their sect; and asserted that good men only were within the pale of the church.

ASTAROTH, or ASHTAROTH, in antiquity, a goddess of the Sidonians. The word is Syriac, and signifies sheep, especially when their udders are turgid with milk.

ASTARTE, the singular of Astaroth, a goddess of the Sidonians, and called in scripture, the Queen of Heaven. This deity is said to have consecrated the city of Tyre, by depositing in it a fallen star.

ASTATI, a sect of Christian hereticks, the followers of one Sergius, who revived the errors of the Manichees. They were remarkable for their inconsistent principles.

ASTER, STAR-WORT, in botany, a genus of the *syngenesia-polygamia* class of plants, with a radiated flower, the disk of which is composed of floscules, and its border of semifloscules; the receptacle is plane and naked, and the seeds are of an oblong figure, oval at top, and winged with down. There are various species of asters, some of which are perennial, and others which are annual; but the most beautiful and greatest in esteem is the China aster, commonly called the Queen Margaret, of which there are three sorts; one with purple flowers, another with pink-colored flowers, and the third with white flowers: of each of these sorts, there is a variety producing double flowers, which are most esteemed.

The seeds of star-wort are accounted deobstruent, its flowers cardiack, its leaves vulnerary, and the roots sudorifick and alexipharmick, and consequently good in disorders of the breast and lungs.

ASTERIA, in natural history, a beautiful pellucid gem of variable colours, when viewed in different lights. It is generally known among jewellers by the name of cat's eye.

ASTERIA is also the name of an extraneous fossil, called in English the star-stone.

ASTERISK, a mark in the form of a star (\*) placed over any word or sentence, to render it more conspicuous, or to refer the reader to the margin, or elsewhere, for a quotation, or the like.

ASTERISM, in astronomy, the same with constellation. See the article CONSTELLATION.

ASTEROPodium, a kind of extraneous fossil, of the same substance with the asteria or star-stone, to which it serves as a basis.

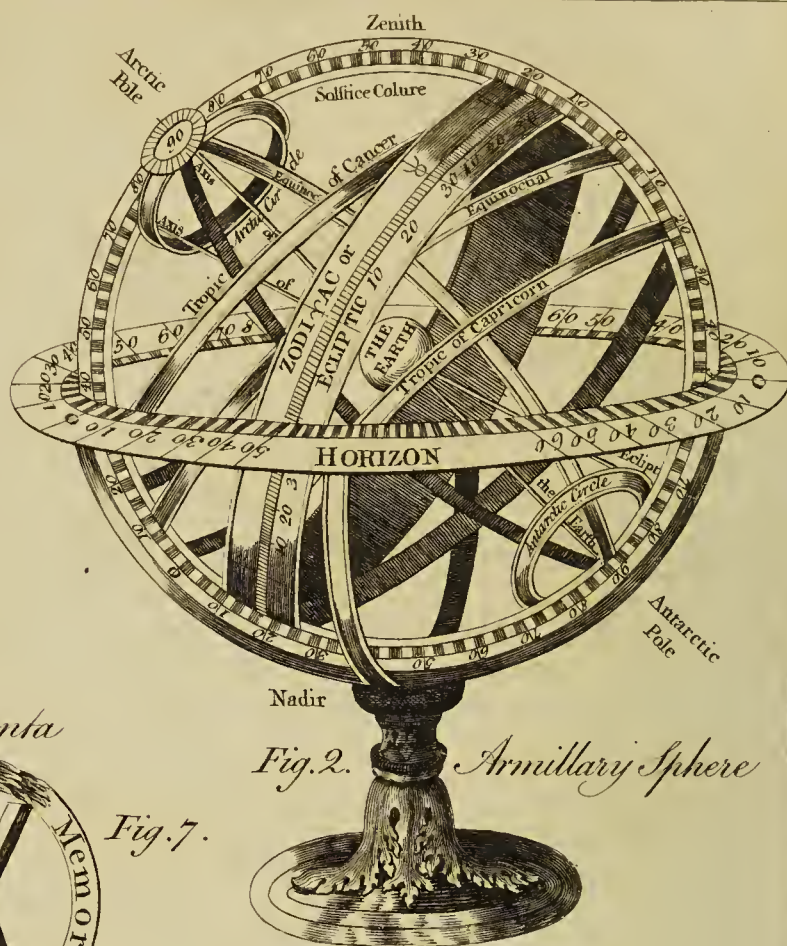
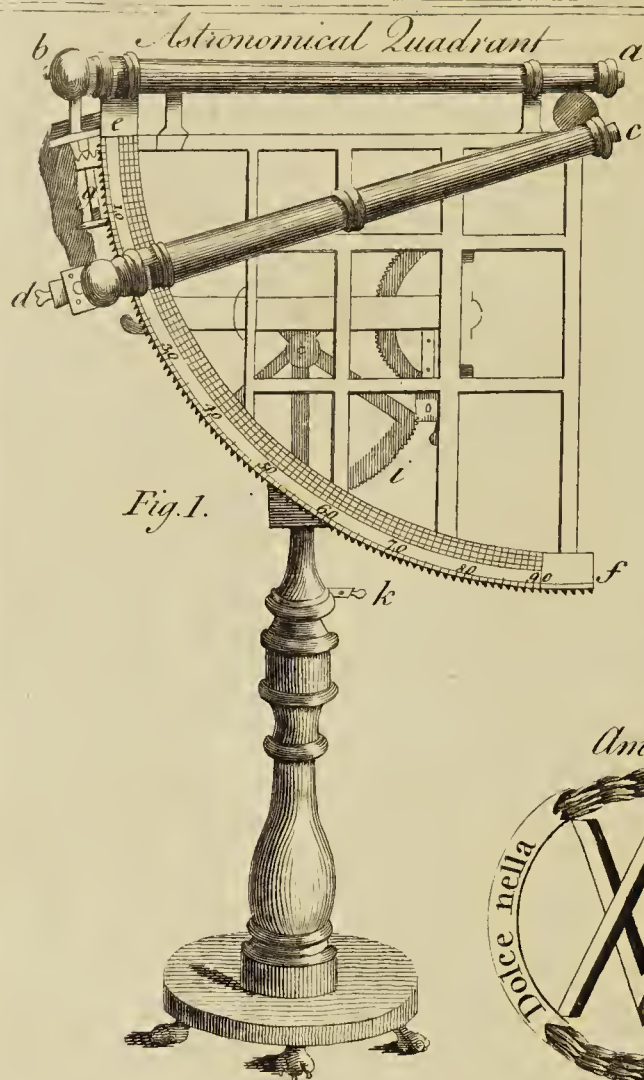
ASTEROPTERUS, in botany, a name given by Vaillant to the *aster*, or starwort. See the article ASTER.

ASTHMA, in medicine, a painful, difficult and laborious respiration, occasioned by intolerable straits of the lungs, which endangers suffocation, as it disturbs

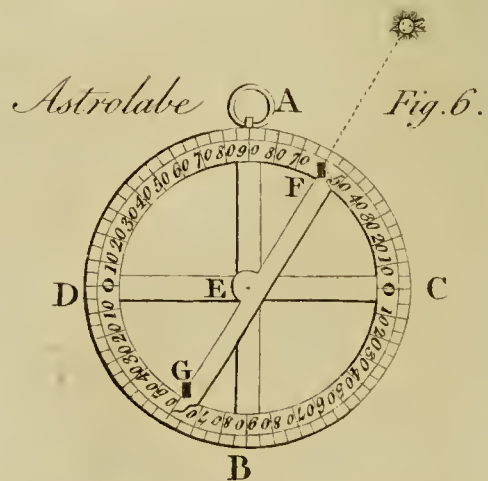
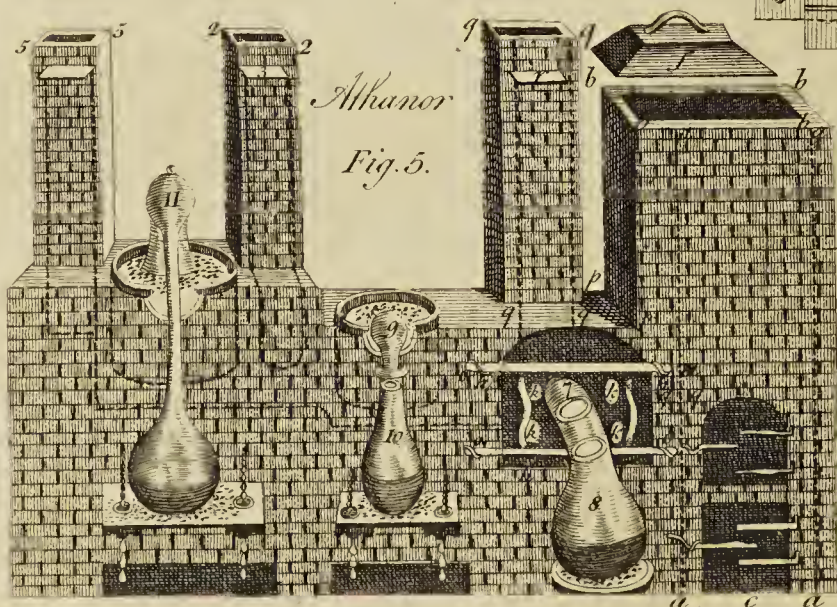
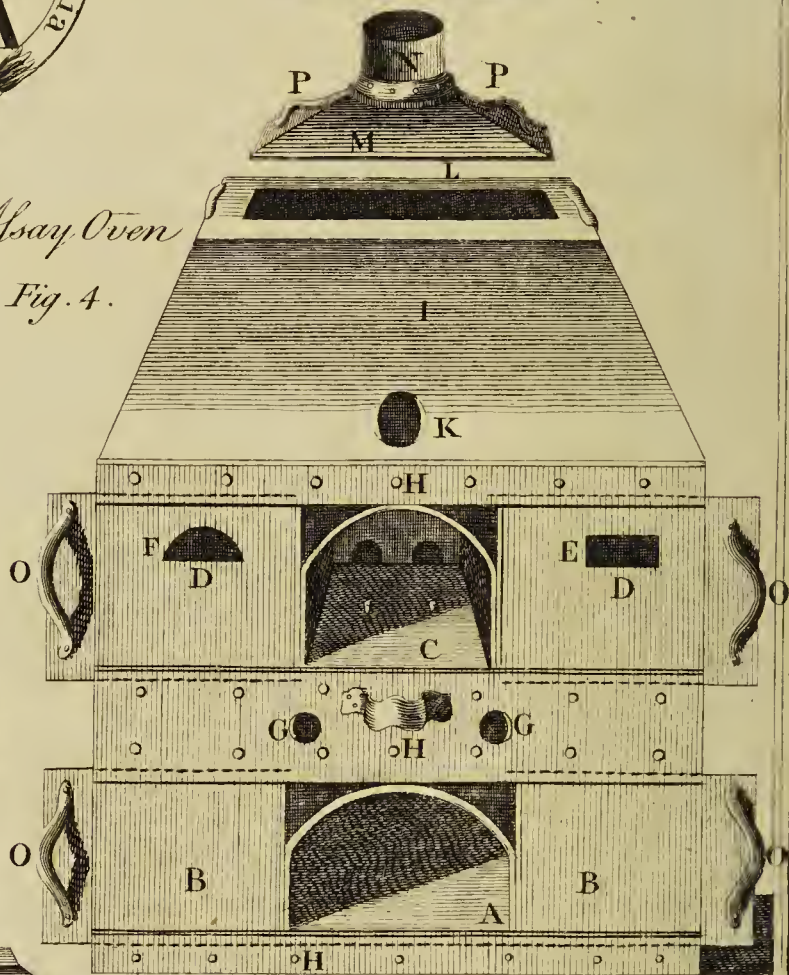








*Assay Oven*  
Fig. 4.





disturbs the free circulation of the blood through the lungs.

This disorder is attended with violent motions of the diaphragm, abdominal and intercostal muscles, to the very scapula and pinnæ of the nostrils. It is usually divided into pneumonick and convulsive; the former of which is generally occasioned by abounding in gross, visciduous, or purulent humours, collected in the cavities of the lungs, which stop up the passages of the air, and compress the bronchia. That kind called the convulsive asthma is occasioned by an irregular motion of the animal spirits, either by reason of an obstruction, or some other obstacle.

The asthma is either continual, or intermitting and periodical, and returns commonly when a sober regimen is not observed.

This disorder proves most violent while the patient is in bed, and in a prone posture, as in that case the contents of the lower belly bearing against the diaphragm, lessen the capacity of the breast, and leave the lungs less room to play.

The cure of the true or pneumonick asthma is by bleeding, after which emeticks may be used; and if the paroxysm returns, epispasticks, with glysters instead of purges. Infusions from *em. equin.* or the juices thereof, are accounted excellent. Oxy-mel of squills and simple cinnamon-water, or garlick, are good in case of viscid and tough humours, where anodynes are very hurtful.

For the convulsive kind, the cure is attempted by antispasmodicks, antihystericks, antispasmodicks, opiates, &c.

ASTRAGAL, in architecture, a little round moulding in the form of a ring, placed as an ornament at the tops and bottoms of columns.

ASTRAGAL, in anatomy, the bone of the heel, whose convex head is articulated to the tibia.

ASTRAGAL, in gunnery, a round moulding incompassing a cannon, about half a foot from its mouth.

ASTRAGALUS, MILK-VETCH, in botany, a genus of the *diadelphia-decandria* class of plants, with a papilionaceous flower, and a bilocular-podded fruit, containing kidney-like seeds. It is said to be diuretick, and good for increasing the milk of wet nurses.

ASTRAL, something belonging to, or connected with the stars: thus, astral year is the same with fide-rial year.

ASTRANTIA, BLACK MASTER-WORT, in botany, a genus of umbelliferous plants, belonging to the *pentandria-digynia* class of Linnaeus.

ASTRINGENTS, among physicians, implies such medicines as are of an astringent or binding quality.

ASTORITES, or STAR-STONE, in natural history, a name given to certain extraneous fossil stones, in form of short, and commonly somewhat crooked, columns, composed of several joints; each resembling the figure of a radiated star, with a greater or smaller number of rays in the different species: they are usually found of about an inch in length, and of the thickness of a goose-quill. Some of them have five angles, or rays, and others only four; and in some the angles are equidistant, while in others they are irregularly so; in some also they are short and blunt, while in others they are long, narrow, and pointed; and some have their angles so very short and obtuse, that at first sight they might be taken for entrochoasteria. The several joints in the same specimen are usually all of the same thickness; this however is not always the case, but in some they are larger at one end, and in others at the middle, than in any other part of the body; and some species have one of the rays bifid, so as to emulate the appearance of a fix-rayed kind.

ASTROLABE, among the ancients, implied an instrument for facilitating the study of astronomy, and what we now call an armillary sphere. See ARMILLARY Sphere.

ASTROLABE, also implies, a stereographical projection of the sphere, either upon the plane of the equator, or the meridian.

ASTROLABE, is also an instrument for taking the altitude of the sun or stars at sea, and consists of a

brass ring ABCD, (*plate VI. fig. 6.*) the limbs of which are divided into degrees and minutes, beginning both ways from C and D, and ending at 90 deg. in A and B. A moveable index FG, carrying two sights, moves upon the centre E; and at the zenith, or upper part of the instrument, is a ring A, by which it is suspended during the time of observation. When the instrument is used, the index is turned towards the sun, so that the rays may pass freely through both sights, when the fiducial edge of the index will cut the degrees of altitude on the divided limb.

ASTROLOGICAL, something belonging to astrology.

ASTROLOGY, a science, which teaches to judge of the effects and influences of the stars, and to foretell future events by the situation and different aspects of the heavenly bodies. It may be divided into two branches, natural and judiciary; the former being the prediction of natural effects, as the changes of weather, winds, storms, hurricanes, thunder, floods, earthquakes, &c. which Mr. Goad has treated of at large in his two books of astrology: and the latter that which foretells future events; in which study many of the ancients were very remarkable; the learned Cardan also has written very judiciously a large folio volume, wherein he has given all the aphorisms of the ancients, elucidated by the nativities of several eminent persons.

ASTRONOMICAL Quadrant, is an instrument contrived to take the altitude, &c. of the heavenly bodies in a very accurate manner. This instrument is generally made of brass, or wooden bars faced with plates of iron, having its limb *fe*, (*plate VI. fig. 1.*) divided either diagonally or otherwise into degrees, minutes, and seconds, if possible, with two telescopes; one fixed on the side of it, as *ab*, and the other *cd* moveable upon the centre, by means of the screw *g*. And, by the help of screws and the dentated wheels *i*, together with the screw *k*, it is easily directed to any object, or phenomenon.

ASTRONOMY, that science which treats of the heavenly bodies, explaining the motions, times, and causes of the motions, distances, magnitudes, gravities, light, &c. of the sun, moon, and stars; the nature and causes of the eclipses of the sun and moon, the conjunction and opposition of the planets, and any other of their mutual aspects, with the time when any of them did or will happen. As the heavens may be considered either as they appear to the naked eye, or as they are discovered by the understanding; hence astronomy may be divided into two branches, spherical and theoretical. Spherical astronomy is the consideration of the universe as it offers itself to our sight; under which head come all the appearances of the heavens, such as we perceive them, without any enquiry into the reason, the theory, or the truth of these appearances. Theoretical astronomy is the consideration of the true structure of the universe, accounting for the various phenomena of the heavenly bodies; the several parts of which may be seen under the articles SYSTEM, SUN, STAR, PLANET, EARTH, MOON, SATELLITES, and COMET. With respect to its different states, astronomy is also divided into ancient and modern: ancient astronomy is such as the art stood under Ptolemy and his followers, who supposed the earth quiescent in the centre, and that all the heavenly bodies performed their revolutions round it. See the article *Ptolemaick SYSTEM*.

The modern or new astronomy is that which has been cultivated since the time of Copernicus, who revived Pythagoras and Philolaus's opinion of the motion of the earth, and laid the foundation of the true solar system. See COPERNICAN System.

Among the most celebrated astronomical writers we may reckon Ptolemy, who has preserved the observations of the ancients, Albategenius, who has given the observations of the Saracens, Sacro Bosco, Copernicus, Tycho Brahe, Clavius, Kepler, Galilæo, Hevelius, Dr. Hook, Sir Jonas Moor, Mr. Huygens, Tacquet, Flamsteed, De la Hire, Gregory, Whiston, Dr. Halley, Keill, the two Cassinis, father



father and son, and the great Sir Isaac Newton, to whom we are indebted for astonishing discoveries in this science.

In painting, astronomy is represented like a woman, with a silver crescent on her forehead, an azure mantle and a watchet scarf, besprinkled with golden stars: or it may be represented by a lady in a starry habit, looking towards heaven, and holding an astrolabe in her right hand, and a table of astronomical figures in her left.

ASTROP-WELLS, in Northamptonshire, were recommended eighty years ago by the physicians Willis and Clever, for the cure of the scurvy, asthma, &c.

ASTROPECTEN, a species of star-fish.

ASTROSCOPE, an instrument composed of two cones, having the constellations delineated on their surfaces, whereby the stars may be easily known.

ASTRUM, with chymists, signifies that virtue which accrues to things from their preparation.

ASTRUM, in astronomy. See CONSTELLATION.

ASTYNOMI, in Grecian antiquity, magistrates in Athens, corresponding to the *ediles* of the Romans; they were ten in number.

ASYLUM, a sanctuary, or place of refuge, where criminals shelter themselves from the hands of justice.

It is pretended that the first asylum was built at Athens by the Heraclidæ, as a refuge for those who fled from the oppression of their fathers. Be that as it will, it is certain that the asyla of altars and temples were very ancient, and likewise those of tombs, statues, and other monuments of considerable personages: thus the temple of Diana at Epilefus was a refuge for debtors, the tomb of Theseus for slaves; and Romulus when he built Rome, left a certain space as an asylum to all persons, whether freemen or slaves, with a political view of drawing together great numbers from all quarters to people his new city.

The Jews had their asyla, the most remarkable of which were the six cities of refuge, the temple, and the altar of burnt offerings. This privilege began likewise to be enjoyed by the Christian churches in the reign of Constantine, at which time the altar only and the inward fabrick of the church were a place of refuge; but afterwards the whole precincts, nay even the graves of the dead, crosses, schools, &c. were comprehended in that privilege. As asyla were not intended originally to patronize wickedness, but as a refuge for the innocent, the injured and the oppressed. Several crimes were excepted by law, for which the church could grant no protection; as, 1. Protection was denied to publick debtors. 2. To Jews who pretended to turn Christians, in order to avoid suffering legal punishment for their crimes. 3. To hereticks and apostates. 4. To slaves who fled from their masters. And, 5. To robbers murderers, conspirators, ravishers, &c.

Modern sanctuaries are a great abuse of those ancient asyla of the Christian church, in giving protection to almost all sorts of criminals, and so enervating the force of civil laws. The canon law of Gratian and the decretals of the popes, grant protection to almost all criminals; and Polydore Virgil censures the English, who did not even exempt traitors and rebels from flying to asyla: but at present we have no such practice, nor is there any privileged place in England allowed by law to screen offenders from justice.

ASYMMETRY, in a general sense, the want of proportion between the parts of any thing, being the contrary of symmetry. See SYMMETRY.

In mathematicks, it is used for what is more commonly called incommensurability. See the article INCOMMENSURABLE.

ASYMPTOTE, in geometry, a line which continually approaches nearer to another, but, though continued infinitely, will never meet with it: of these there are many kinds. In strictness, however,

The term asymptotes is appropriated to right lines, which approach nearer and nearer to some curve, of which they are said to be the asymptotes; but if they and their curve are indefinitely continued they will never meet.

ASYMPTOTICK Space, the same with hyperbolic space. See HYPERBOLICK Space.

ASYNODETON, in grammar, a figure which omits the conjunctions in a sentence; as for example, *veni, vidi, vici*; I came, I saw, I conquered; the conjunction *et* is omitted.

ATARAXY, a term used by the stoicks and scepticks, to denote that calmness of mind which secures us from all emotions arising from vanity or self-conceit. In this consisted the *summum bonum*, or sovereign good.

ATAXY, in a general sense, the want of order: with physicians it signifies the irregularity of crises and paroxysms of fevers.

ATCHE, in commerce, a small silver coin used in Turkey, and worth only one third of the English penny.

ATCHIEVEMENT, in heraldry, denotes the arms of a person or family, together with all the exterior ornaments of the shield, as helmet, mantle, crest, scrolls, motto, and such quartering as may have been acquired by alliances, all marshalled in their proper order.

A TEMPO GIUSTO, in music, signifies to sing or play in an equal, true, and just time.

ATHAMADULET, the prime minister of the Persian empire.

ATHANASIAN CREED, that supposed to have been composed by St. Athanasius. See CREED.

ATHANATI, among the ancient Persians, signified a body of cavalry consisting of ten thousand men, always kept complete.

ATHANOR, in chymistry, a kind of fixed and large, digesting furnace, so contrived, by means of a tower, to keep up a constant, moderate heat, for a considerable time, and which may be increased or diminished at pleasure, by shutting or opening the registers.

For a just representation of the Athanor furnace, see (plate VI. fig. 5.) *aaaa*, the principal furnace, or tower of the athanor, where the fire is lighted; *bbbb*, the inner sides which form the cavity, and are each ten inches long; *c*, the door of the ash-hole; *e*, the upper door; even with the bottom of which is placed a grate; *f*, the cover wherewith the upper aperture of the tower is shut; *gg*, a flue, through which the fire ascends from the tower into the highest furnace; *hhbb*, a hollow prison, which forms the first secondary furnace; with a semi-cylindrical arch, wherewith the aforesaid prison is closed up; *kkkk*, an ironplate coated within, wherewith the first secondary furnace is shut. In this plate is a round hole, through which the neck of the vessel 7 may be passed; *n*, iron bars; *oooo*, iron-hooks, fastened to the wall to receive the iron bars; *qqqq*, the funnel of the furnace; *r*, an iron plate, wherewith the funnel may be shut; *tt*, another flue, through which the fire passes from the first secondary furnace to the second; there is another secondary furnace cylindrical; with its upper circular aperture, sloped at the fore-part, to receive an iron pot, which is to be hung in this secondary furnace; and a flue, which conveys the fire from the second to the third furnace; there is also the third secondary furnace, having an iron pot, like the second; 22, the second funnel; 3, a plate to shut the funnel; and an aperture which leads from the third furnace into the funnel; 55, the third funnel; 7, an earthen retort, placed in the first secondary furnace, with its neck through the hole in the door; 8, a receiver; 9, a glass retort, placed in the iron pot belonging to the second secondary furnace, which pot is filled with sand; 10, a receiver; 11, a glass cucurbit, with its head placed in the pot of the third furnace; lastly, the stands that support the receivers, and which may be raised or lowered by help of screws.

*Use of the ATHANOR.*—You must put in, at the upper arch-door *e*, a semi-cylindrical muffle, twelve inches long, of the same height and breadth of the door, three quarters of an inch thick, and open behind, being shut there by the hinder part of the athanor: for this purpose, a tile must be placed on the grate which is even with the bottom of the door *e*, to support the muffle. Under this muffle you may place your



your cement-pots, or such bodies as must be calcined with a long and violent fire; which may be done without a muffle, though not so well. In the first secondary cylindrical arched furnace, *bbbb*, you may perform the most violent distillations with an open fire; for retorts and other vessels may be introduced into it, by taking away the door *kkkk*, and placed either upon the hearth itself, or on a particular support of stone: but you must be careful to place those vessels in such a manner, that their necks may pass through the hole in the door *kkkk*. You may close all the crevices of the door with lute. To the neck of the retort apply a cylindrical segment ten or twelve inches long, that the heat of the vapours may be gradually diminished, lest the receiver, which must be of glass, should split. The receiver must be luted to the other orifice of the said segment, and supported by a kind of trivet. In this chamber, instead of distillations, you may make cementations, calcinations, &c. in which case the round hole in the iron plate *kkkk*, must be shut.

The second and third secondary furnaces serve chiefly to perform such operations as are made in baths of sand, ashes, or filings. You may also make in these furnaces distillations by a reverberating fire, as in the first; only the fire is less violent in these, though sufficient for distilling aqua-fortis. In order to this, you must take out the iron pot, and invert it on the mouth of the furnace; by this means the segment cut out from the pot, together with that cut out from the side of the cavity, will form a hole for the neck of the retort.

All the apparatus being thus prepared, you must introduce, through the top of the tower *bbbb*, a few burning coals, and then a sufficient quantity of fuel, so that the tower may be entirely filled, or only in part, according to the nature of the operation. Then immediately put on the iron cover *f*, and close exactly all the crevices with lute; for if you neglect this caution, all the fuel contained in the tower would immediately be kindled, which might be attended with very bad consequences.

*Manner of regulating the Fire.*—The fire may be made very strong in the first chamber *bbbb*, that is cylindrically arched, by leaving the door of the ash-hole *c*, and the funnel *qqqq*, of the chamber, quite open, and the fire have free liberty to pass from the tower into this cavity: but the closer the funnel is shut, together with the door of the ash-hole, the more the violence of the heat diminishes; and this will be soon effected, if the iron slider, which separates this cavity from the tower, be partly let down. Observe also, when the strongest fire is required, that the hole in the door *kkkk*, be closer stopped; because when open, the air, by rushing violently through it, cools the bodies placed in that cavity. At the same time, distillation, or some other process, may be performed, and with the same fire, in the second and third furnaces; for the fire penetrates from the first cavity into the second, and increases when the funnel *22*, erected on it, is opened: but before you do this, the funnel of the first cavity must be shut as much as that of the second is opened. By the same means you may hinder the fire, which serves for the operations made in the two first cavities, from going out through their funnels, and force it out through the funnel *55*, by which means it will also act upon the bodies placed in that cavity: for the more the funnel erected on the third cavity is open, the more one or both the funnels of the other cavities must be closed: whence it is plain, that you cannot have the strongest fire in the third cavity, unless there be an equal degree of fire in the other two; but, on the contrary, the heat in the third cavity may be rendered less, by closing its funnel, though it be violent in the others. The same is true of the second cavity, with regard to the first. You cannot make the strongest fire under the muffle placed within the upper door *e*, of the tower, unless you have an equal fire in the first cavity; which fire may consequently be increased by shutting the door quite against the muffle, and diminished by opening it; there being, at the same time, an equal heat in the first and following chambers.

ATHEIST, a person who does not believe the ex-

istence of a Deity. Many people, both ancient and modern, have pretended to atheism, or have been reckoned atheists by the world; but it is justly questioned whether any man seriously adopted such a principal. These pretensions, therefore, must be founded on pride or affectation. That *fools have said in their hearts, there is no God*, is not altogether so improbable; as they are incapable of examining any thing with attention, or employing those faculties properly with which nature has invested them.

ATHELING, ETHLING, ETHELING, or ADELING, among our Saxon ancestors, was a title of honour properly belonging to the heir apparent, or presumptive, to the crown. This honourable appellation was first conferred by king Edward the Confessor, on Edgar, to whom he was great-uncle, when, being without any issue of his own, he intended to make him his heir.

ATHENÆUM, in antiquity, a publick place wherein the professors of the liberal arts held their assemblies, the rhetoricians declaimed, and the poets rehearsed their performances.

These places, of which there were a great number at Athens, were built in the manner of amphitheatres, encompassed with seats, called *cunei*. The three most celebrated *athenæa* were those at Athens, at Rome, and at Lyons, the second of which was built by the emperor Adrian.

ATHLETÆ, in antiquity, men of remarkable strength and agility, disciplined to perform in the publick games. This was a general term, under which were comprehended wrestlers, boxers, runners, leapers, throwers of the discus, and those who practised in other exercises exhibited in the Olympick, Pythian, and other solemn sports, wherein there were prizes allotted for the conquerors.

ATHWART, in navigation, a-cross; as athwart hawse, a ship is said to lie in that position when she bears with her side against another's stem.

ATHWART the *Fore-foot*, is a shot generally directed to stop a ship, and make her remain with her sails slackened, till she is examined; and is levelling the shot so that it may fall directly under the prow or stem.

ATHWART *Ships*, reaching from one end of the ship to the other.

ATLANTICK OCEAN, that bounded by Europe and Africa on the east, and by America on the west.

ATLANTIDES, in astronomy. See PLEIADES.

ATLAS, the name of a ridge of mountains, running from east to west through the north of Africa, from whence the Atlantick Ocean took its name.

ATLAS, in architecture, the same with telamon. See TELAMON.

ATLAS, in anatomy, the name by which some call the first vertebra of the neck; so called in allusion to Mount Atlas.

ATLAS, in matters of literature, denotes a book of universal geography, containing maps of all the known parts of the world.

ATMOSPHERE, the vast collection of air which furrounds the earth for a great height.

*Height of the ATMOSPHERE.* If the air were of an equal density throughout, the height of the atmosphere might be determined: for it appears from experiments that a column of air 72 feet high is equal in weight to one inch of water of the same base; so that the density of air is to that of water as 1 to 864. It has also been found by experiment, that the weight of a column of air, reaching to the height of the atmosphere, will be equal to the weight of a column of water of the same base, and 32 feet, or 384 inches high. Hence  $864 \times 384$  gives 331776 inches, or somewhat more than five miles for the height of the atmosphere, were the density of the air every where the same as at the earth. But since its density decreases with the pressure, it will be more rarefied and expanded the higher we go; by which means the height of the atmosphere becomes indefinite, and terminates in pure æther. See ÆTHER.

However, though it is impossible to assign the real height of the atmosphere, it nevertheless appears certain from experiments, that 45 or 50 miles is the utmost height where the density is sufficient to refract a



ray of light; and, therefore, that may be accounted the altitude of the atmosphere, to the least sensible degree of density.

To discover this altitude of the atmosphere, we have the following method. Let *ADL* (*plate VIII. fig. 4.*) be the surface of the earth, *CM* the atmosphere, *S* the sun below the horizon, *SB* a ray of light touching the earth, which is reflected by a particle of air, in the highest part at *B*, in the horizontal line *BA* to a spectator at *A*. The angle *SBN* is the depression of the sun below the horizon, which, in this case, because it is the moment the twilight ends, is known from observation to be about 18 degrees. But because *BA* is also a tangent, the angle  $\angle AOD = \angle SBN = 18$  degrees; and the angle  $\angle AOB = \frac{1}{2} \angle AOD = 9$  degrees; which would be true, did the ray *SB* pass through the atmosphere without refraction: but because it does not, but is refracted or bent towards *H*, the angle *AOB* must be diminished by the horizontal refraction, which is about half a degree; whence the angle  $\angle AOB = 8^{\circ}. 30'$ .

Therefore in the right-angled triangle *AOR* we have all the angles given, and one side (*viz.* *AO* = 4000 miles, or the semidiameter of the earth) to find the side *BO*, thus:

As the sin of the angle  $\angle ABO = 81^{\circ}. 30' = 9.995203$   
Is to the side *AO* - - - = 4000 = 3.602060  
So is the radius - - - - -  $90^{\circ} = 10.000000$

To the side *BO* - - - =  $4044\frac{1}{2} = 3.606857$

Wherefore *BO* - *HO* = *HB* =  $44\frac{1}{2}$  miles, the height of the atmosphere required.

**Pressure of the ATMOSPHERE.**—It has been already observed, under the article *AIR*, that the atmosphere is a perfect chaos of different effluvia, consisting of almost all kinds of corpuscles, confusedly jumbled together, and constituting one mass; water, fire, volatile salts, and oils, &c. are there blended together in different proportions. Hence it is no wonder that the gravity of the atmosphere should vary, according as the more light or more ponderous of these constituent parts prevail in it: and, in fact, it is found sometimes to sustain a pillar of 31 inches high, in the barometer; when, at others, it will raise the mercury but to the height of 28 inches. Taking therefore  $29\frac{1}{2}$  inches for the mean altitude of the mercury, a column of it, whose base is one square inch, weighs about 15 pounds, which is equal to the pressure of the air upon every square inch. Hence, supposing the surface of a man's body to be  $14\frac{1}{2}$  square feet, the pressure of the air sustained by him will be 31320 pounds, or nearly 14 tons at a medium: whereas, when the air is lightest, it will be only  $13\frac{1}{5}$  tons; and when heaviest,  $14\frac{3}{10}$  tons, the difference of which  $1\frac{1}{10}$  tons = 2464 pounds, where-with we are compressed more at one time than another.

This great difference of pressure must greatly affect us, in regard to the animal functions, and consequently with respect to health. If a person, for instance be asthmatical, he will find his disorder increase with the levity of the air. Again, the reason why we think the air lightest in fine weather, when it is really heaviest, is because the greater pressure constricts the fibres and nerves, and thereby makes them more vigorous than ordinary: whereas, on the contrary, when this pressure is lessened by near 2500 pounds, the fibres are relaxed, and a gloomy inactivity and heaviness ensues.

If it be required to find the weight of the whole atmosphere upon the earth's surface, we may proceed thus: suppose the earth's diameter in round numbers 8000 miles, the area of a great circle will be  $8000 \times 8000 + 0.7854 = 50266400$  square miles, which multiplied by 4 gives 201065600 square miles for the surface of the earth; but, because we took the diameter a little too large, we may take 200,000,000 for the number of square miles in the earth's surface; in one square mile are ( $5280 \times 5280 =$ ) 27878400 square feet, therefore on the earth's surface we have 5575680000000000 square feet, which multiply by 2660 (the pressure on each square foot) gives 14831308800000000000 pounds troy for the whole pressure.

**Refractive Power of the ATMOSPHERE.**—Besides other innumerable conveniencies we receive from the atmosphere, it is a principal cause of rendering our earth that beautiful scene it now appears. It is the atmosphere that makes the face of heaven or firmament appear lucid and bright while the sun shines; for if no atmosphere surrounded and involved the earth, only that part of the heavens in which the sun was placed, would appear to shine; and a spectator, if he should turn his back to the sun, would immediately perceive it as dark as night; and even in the day-time, while the sun shined, the least stars would be seen as plain as in the darkest night, because there would be no substance to reflect the sun's rays to our eyes; and all the rays that do not fall upon the surface of the earth passing by us, would either illuminate the planets and stars, or spreading themselves out in infinite space, would never be reflected back to us.

But since there is an atmosphere surrounding the earth, which is strongly illuminated by the sun, it reflects the light back to us, and causes the whole heavens to shine with such splendor, as to obscure the faint light of the stars and render them invisible.

If there were no atmosphere, the sun would shine as bright as at noon just before his setting, and the moment he was below the horizon, the whole face of the earth would be involved in as pitchy darkness as at midnight. The same phenomena would also attend the sun's rising. But how inconvenient would such sudden transitions from the greatest darkness to the greatest light, prove to the inhabitants of the earth?

This inconvenience is removed by the atmosphere: for though after sun-setting we receive no direct light from the sun, yet we enjoy his reflected light from the sun, yet we enjoy his reflected light for a considerable time: so that the darkness of the night comes on gradually. In the morning also, as soon as the sun comes within 17 deg. 30 min. of the horizon, he begins again to enlighten the atmosphere, and to diffuse his light through the heavens; its brightness continuing to increase by degrees, till the sun rises, and makes full day.

**ATMOSPHERE of the Moon.**—Sir Isaac Newton mentions an atmosphere of the moon, while others are persuaded there is no such thing, because it cannot be perceived. But if we suppose the moon's density to be the same with that of the earth, and to have an equal proportion of fluids, the height of the atmosphere, supposing that planet to have one, would be so small, that it could not be perceived by the nicest observer. It will be allowed, that the height of the atmosphere, will be in proportion to the velocity of the moon round its axis; and the quantity of fluids on its surface.

The velocity of the moon round its axis is less than the twenty-seventh part of the velocity of the earth round its axis; and the quantity of fluids on the surface of the moon will be less than the twelfth part of the quantity of fluids on the surface of the earth; consequently, the height of the atmosphere of the moon must be very little in comparison of the height of the atmosphere of the earth. Supposing the atmosphere of the earth to be fifty miles, which is much too great, the height of the atmosphere of the moon would be less than the sixth part of a mile; which, if viewed from the earth, would subtend an angle less than the sixth part of a second.

The reason assigned by some astronomers for alleging that the moon has no atmosphere, is, that if the moon had an atmosphere, the planets and stars which are often seen near its limb (and sometimes the moon passes over them) would have their light refracted. But it should be observed that, during the transit of the moon over a planet or fixed star, the time of the transit of the atmosphere of the moon would be less than the third part of a second of time; which time is so small, that no astronomer can pretend to observe it.

**ATMOSPHERE of the Sun.** See *SUN*.

**ATMOSPHERE of Solid, or Consistent Bodies,** a kind of sphere formed by the minute corpuscles, or effluvia emitted from them.



**ATOM**, *ατομ*, in philosophy, a particle of matter, so minute as to admit of no division.

Atoms are the *minima naturæ*, and are conceived as the first principles or component parts of all physical magnitude. However, atoms are not accounted indivisible on account of their want of extension (for they have the three dimensions of physical magnitude) but they are conceived indivisible on account of their solidity, hardness, and impenetrability, which leave no vacancy for the admission of any foreign force, to separate and disunite them, and consequently exclude a division.

Thus it is necessary they should be indissoluble, in order to their being incorruptible, which quality they must be possessed of, as being the pre-existent matter of which bodies were made. Sir Isaac Newton adds, that it is required they should be immutable, in order to the world's continuing in the same state, and bodies being of the same nature now as formerly; from which considerations the ancients were led to assert the eternity of atoms, as whatever is immutable, must be eternal.

The doctrine of atoms was carried much further by the ancients: they ascribed gravity to them; and, in consequence, maintained, that they were endued with motion: and further observing, that their falling perpendicularly could not join or unite them together, they superadded a fortuitous motion sideways, and provided them with certain hooked parts, to enable them the better to hang together; and from a casual or fortuitous jumble of these hooked intangled atoms, they supposed the whole universe to be formed.

**ATOMICAL Philosophy**, denotes the doctrine of atoms; or a method of accounting for the origin and formation of all things, from the supposition of atoms, being endued with gravity and motion. This philosophy was first broached by Moschus, some time before the Trojan war, but was much cultivated and improved by Epicurus, whence it is denominated, the Epicurean philosophy. See **EPICUREAN**.

**ATONEMENT**. See **EXPIATION**.

**ATONY**, in medicine, a defect of tons or tension, or a laxity, or debility of the solids of a body, occasioning faintings, weaknesses, &c.

**ATRA BILIS**, black bile, one of the humours of the ancient physicians; which the moderns call melancholy.

**ATTRACTYLIS**, in botany, a genus of the syngenesia polygamia æqualis class. The corolla is radiated, and each corolla of the radius has five teeth. The species are three, none of which are natives of Britain.

**ATRAGENE**, in botany, a genus of the polyandria polygynia class. The calix has four leaves; the petals are 12; and the seeds are caudated. There are three species, all natives of the east.

**ATRAPHAXIS**, in botany, a genus of the hexandria digynia class. The calix has two leaves; the petals are two, and sinuated; and there is but one seed. There are two species; viz. the spinosa, a native of Media; and the undulata, a native of Æthiopia.

**ATRÆTI**, in medicine, infants having no perforation in the anus, or persons imperforated in the vagina or urethra.

**A-TRIP**, in navigation, a ship's top-sails are said to be a-trip, when they are hoisted up to their full extent, or to the mast-head.

**A-TRIP**, the anchor is so called, when the ship, in a perpendicular direction, drags or heaves it out of the ground.

**ATRIPLEX**, in botany, a genus of the polygamia monœcia class. The calix of the hermaphrodite flower has five leaves; it has no corolla; the stamina are five, and the stylus is divided into two parts; and there is but one depressed seed. The calix of the female flower has two leaves; it has no corolla nor stamina; the stylus is divided into two parts; and there is but one depressed seed. Atriplex is esteemed cooling and emollient, and its seeds, given internally, diuretick, and good in the disorders of the uterus.

**ATROPA**, in botany, a genus of the pentandria monogynia class. The corolla is shaped like a bell; the stamina are distant; the berry is globular, and consists of two cells or apartments. The species are five; viz. 1. The mandragora, or mandrake, a native

of Spain and the east. The mandrake is divided into male and female. The male mandrake has a very large, long, and thick root; it is largest at the top or head, and from thence gradually grows smaller. Sometimes it is single and undivided to the bottom: but more frequently it is divided into two, sometimes into three, or more parts. From this root there arise a number of very long leaves, broadest in the middle, narrow towards the base, and obtusely pointed at the end; they are of a foot or more in length, and five inches or thereabouts in breadth; they are of a dusky and disagreeable green colour, and of a very foetid smell. The female mandrake perfectly resembles the other in its manner of growth; but the leaves are longer and narrower, and of a darker colour, as are also the seeds and roots. Authors have spoken very largely and idly of the virtues of this plant. The most common quality attributed to it, is that of rendering barren women fruitful: but we have no tolerable foundation for this: what we certainly know of it is, that it has a soporifick virtue like that of opium; and the bark in small doses, Herman assures us, has often been known to do great service in hysterick complaints; but it should be used sparingly, otherwise it will often bring on convulsions, and many other mischievous symptoms. The ancients used it when they wanted a narcotick of the most powerful kind. 2. The balladonia, or deadly night-shade, a native of Britain: the berries are poisonous. 3. The physalodes, a native of Peru. 4. The frutescens, a native of Spain; and 5. The arborescens, a native of America.

**ATROPHY**, in medicine, a disease, wherein the body, or some of its parts, do not receive the necessary nutriment, but waste and decay incessantly.

**ATTACHMENT**, or **ATTACHING**, in English law, the taking or apprehending of a person, by virtue of a writ or precept.

**ATTACHMENT out of the Chancery**, is obtained upon an affidavit made, that the defendant was served with a subpoena, and made no appearance; or it issueth upon not performing some order of decree.

**ATTACHMENT of the Forest**, is one of the three courts held in the forest. The lowest court is called the *court of Attachment*, or, *wood-mote court*; the mean, *swan-mote*; and the highest the *justice in eyre's seat*. This attachment is by three means; by goods and chattels, by body, pledges, or mainprize; or by the body only. This court is held every forty days throughout the year; and is thence called *forty-days court*.

**ATTACHMENT of Privilege**, is by virtue of a man's privilege to call another to that court whereto he himself belongs, and in respect whereof he is privileged to answer some action.

**Foreign ATTACHMENT**, is an attachment of money or goods found within a liberty or city, to satisfy some creditor within such liberty or city.

By the custom of London, and several other places, a man can attach money or goods in the hands of a stranger, to satisfy himself.

**ATTACHIAMENTA bonorum**, in our old statute books, imports a distress taken upon the goods or chattels of a person sued for a personal estate, or debt, by the legal attachiators, or bailiffs, as a security to answer the action.

**ATTACHIAMENTA de spinis et bosco**, denotes an ancient privilege granted to the officers of forests, to take to their own use thorns, brush, and windfalls within their own precincts or liberties.

**ATTACK**, a violent attempt upon any person or thing, an assault, or the act of beginning a combat or dispute.

**ATTACK**, in the military art, is an effort made to force a post, break a body of troops, &c.

**ATTACK of a siege**, is a furious assault made by the besiegers with trenches, covers, mines, &c. in order to make themselves masters of a fortress, by storming one of its sides. If there are two or three attacks made at the same time, there should be a communication betwixt them.

**False ATTACKS**, are never carried on with that vigour and briskness that the other is; the design of them being



ing to favour the true attack, by amusing the enemy, obliging the garrison to a greater duty in dividing their forces, that the true attack may be more successful.

To **ATTACK in flank**, is to attack both sides of the bastion.

**ATTAINDER**, in law, is when a man has committed treason, and sentence is passed upon him, in consequence of the same. The children of persons attainted of treason, are thereby rendered incapable of being heir to him, or any other ancestor; and if he were noble before, his posterity are degraded, and made base: nor can this corruption of blood be salved, unless the sentence be reversed by a writ of error, or by act of parliament.

**ATTAINDER**, is two-fold, either by appearance, or by process. Attainder is, 1. By appearance; and is either by battle, by confession, or by verdict. By battle, is when the party appealed by another, choosing rather to try the truth by combat than by jury, is vanquished. Attainder by confession, is either by pleading guilty at the bar, and not putting himself upon trial by the jury, or before the coroner in sanctuary, where, in ancient times, he was obliged to renounce the realm. Attainder by verdict, is when the prisoner at the bar pleads not guilty to the indictment, and is pronounced guilty by the jury. 2. By process, otherwise called attainder by default, which is, where a party flies, or does not appear, after being three times publicly called in the county court and at last upon his default, is pronounced guilty.

*Bill of ATTAINDER*, a bill brought into parliament, for attainting, condemning, and executing a person for high treason.

**ATTAINT**, in law, a writ which lies against a jury who have given a false verdict in any court of record, in a real or personal action, where the debt amounts to above forty shillings.

**ATTAINT**, among farriers, signifies a blow or hurt in a horse's foot, proceeding either from a kick of another horse, or from an over-reach, or striking his hinder against his fore feet.

**ATTELABUS**, in zoology, a genus of insects belonging to the order of coleoptera or beetle-kind. It has four wings, of which the superior is crustaceous, and serve as a sheath or cover to the inferior, which are membranous.

**ATTENTION**, *attentio*, the applying the ear or the mind assiduously to any thing said or done, in order to acquire the knowledge thereof.

Attention of the mind is more properly an act of the will than of the understanding, wherewith the will summons the understanding from the consideration of other objects, to the thing in hand.

Attention in regard of hearing, is the stretching the membrana tympani, to make it more susceptible of sounds, or adjusting the tension of that membrane to the proper key or tone of the sound.

**ATTENUANTS**, in pharmacy, medicines which resolve the viscosity of the humours in the human body; thereby promoting their circulation as well as the discharge of all noxious and excrementitious matter.

**ATTESTATION**, the act of affirming or witnessing the truth of some fact, especially in writing.

**ATTICK**, any thing relating to Attica, or to the city of Athens: thus Attick salt, in philology, is a delicate poignant sort of wit and humour peculiar to the Athenian writers; Attick witness, a witness incapable of corruption, is called *Atticus testis*, or Attick witness.

**ATTICK**; in architecture, a sort of building wherein the roof or covering is not to be seen; thus named, because the buildings at Athens were generally of this form.

**ATTICK order**, a small order raised upon a large one, by way of crowning, or to finish the building; or it is, according to some, a kind of rich pedestal, sometimes used for the convenience of having a wardrobe, or the like; and instead of columns, has only pilasters of a particular form, and sometimes no pilasters at all.

The name Attick is also given to a whole story into which this order enters; this little order being always found over another greater one.

**ATTICK base**, a peculiar kind of base used by the ancient architects in the Ionick order; and by Palladio; and some others in the Dorick.

**ATTIRE**, among botanists, the little roundish or oblong bodies on the tops of the stamina of plants.

**ATTIRE**, in hunting, signifies the head or horns of a deer. The attire of a stag, if perfect, consists of bur, pearls, beams, gutters, antler, sur-antler, royal, sur-royal, and croches; of a buck, of the bur, beam, brow-antler, advancer, palm and spellers.

**ATTITUDE**, in painting and sculpture, the gesture of a figure, or statue; or it is such a disposition of their parts, as serves to express the action and sentiments of the person represented.

**ATTOLLENS**, in anatomy, an appellation given to several muscles, otherwise called *levator* and *elevator*.

**ATTORNIATO FACIENDO**, &c. a writ commanding a sheriff, or steward, to admit an attorney to appear for a person who owes suit to the county court, court baron, &c.

**ATTORNEY**, a person who by consent, commandment, or request, takes heed, fees, and takes upon him the charge of other mens business, in their absence. Attorney is either general or special: Attorney-general is he that by general authority is appointed to all our affairs or suits; as the attorney-general of the king, which is nearly the same with procurator Cæsaris in the Roman empire. Attornies-general are made either by the king's letters patent, or by our appointment before justices in eyre, in open court. Attorney special or particuar, is he that is employed in one or more causes particularly specified. There are also, in respect of the divers courts, attornies at large, and attornies special, belonging to this or that court only.

Attornies in common law, are nearly the same with proctors in the civil law, and solicitors in courts of equity. Attornies sue out writs of process, or commence, carry on, and defend actions, or other proceedings, in the names of other persons, in the courts of common law. None are admitted to act without having served a clerkship for five years, taking the proper oath, being enrolled, and examined by the judges.

**ATTORNEY of the Duchy of Lancaster**, is the second office in that court, and seems to be there, for his skill in the law, placed as an assessor to the chancellor of the court.

**ATTORNEY-GENERAL**, is a great officer under the king, created by letters patent, whose office it is to exhibit informations, and prosecute for the crown in criminal causes; and to file the bills in the exchequer, for any thing concerning the king in inheritance or profits. To him come warrants for making of grants, pardons, &c.

**ATTOURNMENT**, or **ATTORNMMENT**, in law, a transfer from one lord to another, of the homage and service a tenant makes; or to a new lord that acknowledgment of duty.

**ATTRACTION**, in natural philosophy, an indefinite term applicable to all actions whereby bodies tend towards one another, whether by virtue of their weight, electricity, magnetism, impulse, or any other latent power.

The word is Latin, *tractio*, and compounded of *ad*, to, and *traho*, to draw.

Philosophers generally reckon four different sorts of attraction, viz. that of cohesion, of electricity, of magnetism, and gravitation.

**ATTRACTION of Cohesion**, is peculiar to the component particles of bodies, by virtue of which they are firmly connected and held together. The laws and properties of this attraction are the following: 1. It is very discernable and most powerful in corpuscles, or the smallest particles of matter. 2. It is mutually exerted between those particles; or they mutually attract, and are attracted by each other. 3. The sphere of attraction, or extent of this power, is greater in some particles of matter than in others, but very small at the outermost: for, 4. This power is insensible in solid bodies in the least sensible distance, acting as it were only in contact; and therefore, 5. It must be nearly propor-



proportional to the quantity of contiguous surfaces; or the parts of the body cohere most strongly, whose touching surfaces are largest. 6. This power must decrease, as the squares of the distances increase; because it must be supposed to issue from each particle in right lined directions. 7. Where the sphere of attraction ends, there a repelling power begins; by which the particles, instead of attracting, repel and fly from each other. 8. By this power, the small portions or drops of a fluid, conform themselves to a spherical figure.

The first and second of these properties, are evident from various experiments; as the sudden union of two contiguous drops of mercury, water, &c. Thus the drops, (*plate VIII. fig. 2*) will, as soon as they touch each other, run together, and form one large drop. The strong adhesion of two leaden balls, which touch by polished surfaces; as also of glass panes, and in capillary tubes; the rising of water, by the sides of a glass vessel, and into tubes of sand, ashes, sugar, sponge, and all porous substances.

The third property is proved by the sticking or adhering of water to substances, which by mercury are left dry. The fourth and fifth properties are evinced by the hyperbolic curve, formed by the superficies of a fluid ascending between glass-planes touching each other on one side. The sixth property is evident. The seventh appears from the ascent of a steam, or vapour, from humid or fluid bodies; and the eighth property is manifest by drops of water falling on dust.

From this account of the attraction of cohesion, we have a rational solution of several very curious and surprising phenomena; as why the parts of bodies adhere and stick so firmly together; why some are hard, others soft; some fixed, others fluid; some elastic, others void of elasticity: all which arise from the different figures of the particles, and the greater or lesser degree of attraction consequent thereupon. On this principle, we account for the manner how plants imbibe the nutritive juices by the fibres of the roots; also for the rise of the sap in vegetables, and for the whole œconomy of vegetation. Hence the rationale of the various secretions of fluids by the glands, and their wonderful circulation through the fine capillary vessels. Hence also the reason of soldering and gilding metals; also of melting, or fusion, by heat. Hence also the exhalation of vapours by the heat of the sun or fire; the aggregation of aqueous particles in the air, forming the drops of rain. We hence see the reason of distillation, filtration, dissolution, digestion, sublimation, precipitation, crystallization, and the other operations of chymistry and pharmacy. Lastly, it is by this power of attraction and repulsion, that we are to account for those wonderful phenomena of subterranean ascensions and explosions; of volcanos and earthquakes; of hot springs, damps, and suffocating exhalations in mines, &c. See COHESION.

The second species of attraction is that of electrical bodies, as glass, amber, sealing-wax, jet, &c. for the properties of which, see ELECTRICITY.

For the properties of the third kind of attraction, see the articles MAGNET and MAGNETISM.

The fourth kind of attraction, viz. that of gravitation.

The laws of this attraction are, 1. It is common to all bodies, and mutual between them. 2. It is proportional to the quantity of matter in bodies. 3. It is exerted every way from the centre of the attracting body in right-lined directions. 4. It decreases as the squares of the distances increase; that is, if a body at A (*plate VIII. fig. 1.*) on the earth's surface, distant one semidiameter from the centre C, weighs 3600 pounds, it will, at the distance of 2, 3, 4, 5, 6, semidiameters, weigh 900, 400, 225, 145, pounds; which numbers decrease as the squares of the distances 4, 9, 16, 25, 36, increase. Though we reckon this species of attraction different from that of cohesion, yet when well considered, it may be found, perhaps, to differ no otherwise than as the whole from the parts; for the gravity of large bodies may be only the result or aggregate of the particular powers of the constituent particles, which singly act only upon contact, and in small distances; but with their joint forces, in vast quantities,

produce a mighty power, whose efficacy extends to very great distances, proportional to the magnitude of bodies.

This force of gravity is, to sense, the same for any distances near the earth's surface; since a small distance from the surface of the earth does not sensibly alter the distance from the centre, which is near 4000 miles: at the height, therefore, of one mile, for instance, the distances from the centre will be as the number 4000 to 4001, and the powers of gravity inversely as their spaces, viz. as 16008001 to 16000000, or as 16008 to 16000, which are so near an equality, as not to be sensibly different from each other.

But when the distance is so great as to cause a disproportion between that and the semidiameter of the earth, then will the power of gravity decrease very sensibly, according to the law above laid down: thus, at the distance of the moon, which is that of a mean, about 60 semidiameters of the earth, the power of gravity is to that on the earth's surface, as 1 to 3600.

ATTRACTION of Mountains. If it be admitted that all parts of the earth attract each other mutually, it must be granted that there are mountains on it, whose magnitude is considerable enough to make a sensible attraction. Let us suppose the earth a globe of an uniform figure, whose radius is equal to 1500 leagues, and suppose a mountain on the surface of some part of this globe one league in height, it is easy to demonstrate, that a weight placed at the bottom of this mountain shall be attracted horizontally by the mountain, with a force equal to a 3000th part of the weight; so that a pendulum or plumb-line, placed at the bottom of this mountain, must deviate from a perpendicular about a minuet; the calculation is not difficult, and this may be admitted by way of supposition: from whence it follows, that when we observe the elevation of a star at the foot of a great mountain, the plumb-line must deviate from a perpendicular; and an observation of this kind, certainly, would afford a very strong proof in favour of the system of attraction: but, it may be objected, how shall we be sure the plumb-line actually deviates from a perpendicular, as the direction of the plumb-line only determines the vertical situation of the star? This difficulty is easily surmounted.

Let us suppose a star on the north of the mountain, and the person who is to make his observation placed on the south: if the attraction of the mountain acts sensibly on the plumb-line, it will deviate from a perpendicular towards the north; and, consequently, the apparent zenith of the star will go back towards the south; and so the distance of the star, on which the observation is made in the zenith, must be greater than if there was no attraction.

After having made this observation, if we go at a distance from the mountain, on a right line towards the east or west, so far that the attraction no longer operates, an observation, made in this new station will shew the star at a less distance than in the former.

But there is another and better method. It is certain, that, if the plumb-line on the south side of the mountain deviates towards the north, the plumb-line in the north side must deviate towards the south, and the zenith of the star, which in the first case went back towards the north, must, in the latter, advance towards the south: therefore, taking the difference of these two distances, and dividing it into two equal parts, will shew how much the pendulum has deviated from a perpendicular by the attraction of the mountain.

The whole theory is clearly explained, with several remarks, in an excellent Memoir of M. Bouguer's, printed in the year 1749, at the end of his book on the figure of the earth; in which he gives an account of the observations he made in company with M. Condamine, on the north and south sides of the great mountain Chimboraco, in Peru; the result of his observations is, that the attraction of this great mountain causes a deviation of the plumb-line from its perpendicular of 7" and a half. Mr. Bouguer judiciously remarks, that the greatest mountain is a trifle compared to the vast body of the terrestrial globe; and that a hundred observations, where no sensible attraction is found, prove nothing against the Newtonian system; but that this



made at the foot of the vast mountain Chimboraco, which is in favour of the doctrine of attraction, deserves the attention of all philosophers.

**ATTRACTIVE**, something that has the property or power of attraction.

**ATTRIBUTE**, is generally understood to signify that which agrees with some person or thing; or a quality determining something to be after a certain manner. Thus, understanding is an attribute of mind, and extension an attribute of body. That attribute which the mind conceives as the foundation of all the rest, is called its essential attribute: thus extension is by some, and solidity by others, esteemed the essential attribute of body or matter.

Attributes are often distinguished into proper and common: when an attribute is founded on all the essential qualities of any being, it may be called proper; when it belongs only to some one or more of them, it is common.

**ATTRIBUTES**, in theology, the several qualities or perfections of the Divine nature, as his wisdom, power, justice, goodness, &c. and are such as we conceive to constitute the essence of God.

**ATTRIBUTES**, in logick, are the predicates of any subject, or what may be affirmed or denied of any thing.

**ATTRIBUTES**, in painting and sculpture, are symbols added to several figures, to intimate their particular office and character. Thus the eagle is an attribute of Jupiter; a peacock, of Juno; a caducee, of Mercury; a club, of Hercules; and of the apostles, a palm of victory.

**ATTRITION**, *attritio*, the rubbing or striking of bodies one against another, so as to throw off some of their superficial particles. The grinding or polishing of bodies is performed by attrition.

**ATTRITION**, among divines, signifies a sorrow or repentance for having offended God, arising chiefly from the apprehensions of punishment, the loss of heaven, and the torments of hell; and differs from contrition, in as much as this last is conceived to arise from a love to God, as an ingredient or chief motive to our sorrow and repentance. See **CONTRITION**.

**AVARICE**, covetousness, an immoderate desire of any thing, particularly of riches.

**AVAST**, is a sea term, and signifies the same with stop or hold fast.

**AVAUNEHERS**, among hunters, the second branches of a deer's horn.

**AUCTION**, a kind of publick sale, very much in use for household-goods, books, plate, &c. By this method of sale the highest bidder is always the buyer.

**AUDIENCE**, given to ambassadors, ceremonies observed in courts, at the admission of ambassadors, or publick ministers, to a hearing.

In England, audience is given to ambassadors in the presence chamber; to envoys and residents, in a gallery, closet, or in any place where the king happens to be. Upon being admitted, as is the custom of courts, they make three bows, after which they cover and sit down; but not before the king is covered and sat down, and given them the sign to put on their hats.

When the king does not care to have them covered, and sit, he himself stands uncovered; which is taken as a slight.

**AUDITOR**, a person who listens, or attends to any thing.

**AUDITORY Nerves**, in anatomy. See **NERVE**.

**AVELLANE**, in heraldry, implies a cross, whose corners somewhat resemble a filbert nut.

**AVE MARIA**, the angel Gabriel's salutation to the Virgin Mary, when he brought her the tidings of the incarnation. It is become a prayer or form of devotion in the Romish church, and to which the papists ascribe a wonderful efficacy.

**AVENA**, the oat, in botany. See **OAT**.

**AVENAGE**, in law, a certain quantity of oats paid by a tenant to his landlord, instead of rent, or some other duties.

**AVENOR**, an officer belonging to the king's stables,

who provides oats for the horses. He acts by warrant from the master of the horse.

**AVENUE**, in gardening, a walk planted on each side with trees, and leading to an house, garden-gate, wood, &c. and generally terminated by some distant object. The width of avenues should be twelve or fourteen feet greater than the whole breadth of the house; and for those that lead to woods or prospects, they ought not to be less than sixty feet in breadth. The trees proper for planting avenues, are the English elm, the lime tree, the horse chestnut, the beech, and the ash.

**AVERAGE**, in commerce, signifies the accidents and misfortunes which happen to ships and their cargoes, from the time of their loading and sailing to their return and unloading.

Average is more particularly used for a certain contribution that merchants make proportionably to their losses. It also signifies a small duty which those merchants, who send goods in another man's ship, pay to the master for his care of them over and above the freight. Hence it is expressed in the bills of lading, paying so much freight for the said goods, with primage and average accustomed.

**AVERAGE**, in agriculture, implies, in many parts of England, the breaking up land.

**AVER-CORN**, that conveyed to the lord's granaries by his tenants.

**AVERDUPOIS**, or **AVOIRDUPOIS-WEIGHT**, a sort of weight used in England, the pound whereof is made up of sixteen ounces. This is the weight for the larger and coarser commodities, such as groceries, cheese, wool, lead, &c.

**AVERNI**, among ancient naturalists, certain lakes, grottoes, and other places, which infect the air with poisonous steams or vapours, called also *Mephites*.

**AVER-PENNY**, money paid in lieu of average.

**AVERRHOA**, in botany, a genus of the decandria pentagynia class. The calix has five leaves; the petals are five, open at top; and the apple or fruit is pentagonal, and divided into five cells. The species are three, all natives of India.

**AVERRHOISTS**, the followers of Averhoes, a celebrated commentator of Aristotle, who denied the natural immortality of the soul, and yet pretended to acquiesce in the Christian doctrine concerning it.

**AUGMENT**, in grammar, an accident of certain tenses of Greek verbs. It consists either in adding a syllable, or increasing the quantity of the initial vowels.

**AUGMENT**, in mathematicks, the same with increment. See the article **FLUXIONS**.

**AUGMENTATION**, in a general sense, is the act of adding or joining something to another with a design to render it larger.

**AUGMENTATION**, in heraldry, implies additional charges to a coat armour, frequently given as particular marks of honour, and are generally borne either on the escutcheon, or a canton; as have all the baronets of England, who have bore the arms of the Province of Ulster in Ireland.

**AUGRE**, or **AWGRE**, an instrument used by carpenters and joiners, to bore large round holes; and consisting of a wooden handle, and an iron blade, terminated at bottom with a steel bit.

**AUGUR**, in antiquity, an officer among the ancient Romans, appointed to foretell future events, by the chattering, flight, or feeding of birds, &c.

**AUGURY**, the art of foretelling future events, from birds and other omens.

It is distinguished into five sorts. 1. Augury from the heavens. 2. From birds. 3. From chickens. 4. From quadrupedes. 5. From portentous events. When an augury was taken, the augur divided the heavens into four parts, and having sacrificed to the gods, he observed with great attention, from what part the sign from heaven appeared. If, for instance, there happened a clap of thunder from the left, it was taken as a good omen. If a flock of birds came about a man, it was a favourable preface, but the flight of vultures was unlucky. If, when the corn was flung before



fore the sacred chickens, they crouded about it, and eat it greedily, it was looked upon as a favourable omen, but if they refused to eat and drink, it was an unlucky sign.

AUGUST, in a general sense something majestic, venerable, or sacred.

AUGUST, in chronology, the eighth month of our year, containing thirty-one days. August was dedicated to the honour of Augustus Cæsar, because, in the same month, he was created Consul, thrice triumphed in Rome, subdued Egypt to the Roman empire, and made an end of the civil wars; being before called *sextilis*, or the sixth from March.

AUGUSTALES, in antiquity, an epithet given to the flamens or priests, appointed to sacrifice to Augustus, after his deification; and also to the ludi or games, celebrated in honour of the same prince, on the fourth of the ides of October.

AUGUSTIN MONKS, a religious order in the Romish church, who follow the rule of St Augustin, prescribed them by Pope Alexander IV. in the year 1256.

AVIARY, a place set apart for feeding and propagating birds.

AULICK, an epithet given to certain officers of the empire, who compose a court, which decides without appeal, in all processes entered in it.

AULICK, in the Sorbonne and foreign universities, implies an act; which a divine maintains on his being admitted to the degree of a doctor in divinity.

AULOS, *Αυλός*, or STADIUM, a Grecian long measure, containing 125 geometrick paces, or 625 Roman feet; corresponding to our furlong.

AUME, a Dutch measure for Rhenish wines, containing forty English gallons.

AUNE, a long measure used in France to measure cloths, stuffs, ribbons, &c. At Rouen it is equal to one English ell; at Calais, to 1.52; at Lyons, to 1.016; and at Paris, to 0.95.

AVOWEE, one who has a right to present to a benefice.

AVOWRY, in law, is when a person distrained sues for a replevin; for then the distrainer must avow, and justify his plea, which is called his avowry.

AURA, among physiologists, an airy exhalation or vapour. The word is Latin, derived from the Greek *αὔρα* gentle wind.

AURA *vitalis*, in chymistry, a term used by Helmont, for what others call the *flamma vitalis*, or *vital flame*.

AURA, in ornithology, the trivial name of a species of vulture.

AURALIA, in natural history, the nymph or *chrysalis*. See the article CHRYSALIS.

AURANTIUM, in botany, the orange. See the article ORANGE.

AUREOLA, in its original signification, denotes a jewel, which is proposed as a reward of victory in some publick dispute. Hence, the Roman schoolmen applied it to signify the reward bestowed on martyrs, virgins, and doctors, on account of their works of supererogation; and painters use it to signify the crown of glory, with which they adorn the heads of saints, confessors, &c.

AURICLE, in anatomy, that part of the ear which is prominent from the head, called by many authors *auris externa*.

AURICLES, are two muscular bags situated at the basis of the heart.

AURICULA URSI, *bear's ear*, in botany; the flower is funnel-shaped, consisting of one leaf, divided into several segments at the rim. The pistil arises from the cup, and is fixed in the manner of a nail to the hinder part of the flower. It afterwards ripens into a roundish fruit, partly covered by the calix, and opening at the top, is seen to be full of small seeds, fixed to a placenta.

Though this herb is seldom kept in the shops, it nevertheless stands recommended as a vulnerary, and as such is found of service, both for internal and external purposes. Mixed with ointments and plaisters, it is reckoned good in ruptures. Four or six spoonfuls of

water, in which it has been boiled, taken every morning, is said to cure coughs and ulcers of the lungs. The juice of its flowers removes spots of the face and beautifies the skin; and with the same intention some distil a water from it.

AURICULARIS *Digitus*, the little finger, so called, because it is used commonly to pick the ear.

AURICULAR, whatever belongs, or has any relation to the ear.

AURIGA, the WAGGONER, in astronomy, a constellation of the northern hemisphere, consisting of twenty-three stars, according to Tycho; forty according to Hevelius; and sixty-eight in the Britannick catalogue.

AURIPIGMENTUM, Orpiment, in natural history. See the article ORPIMENT.

AURISCALPUM, an instrument to clean the ears, and serving also for other operations in disorders of that part.

AURORA, the morning twilight, or that faint light which appears when the sun is about eighteen degrees below the horizon. The ancient poets deified this light under the name of Aurora, or the goddess of the morning.

AURORA BOREALIS, is an extraordinary meteor, shewing itself in the night-time, in the northern parts of the heavens.

The most general phenomena of it are these: 1. In the northern parts of the horizon, there is an apparent, though not real cloud extended sometimes further towards the west than to the east, and sometimes further towards the east than west, taking up nearly a quarter of the horizon. 2. The upper edge of this cloud is generally terminated with one or more lucid arches, and sometimes by a long bright streak of light, lying parallel to the horizon. 3. Out of these arches proceed streams of light generally perpendicular to the horizon, but sometimes a little inclined to it, and very much resembling the tail of comets. 4. The upper ends of the streams appear and vanish incessantly, which causes such a seeming trembling in the air, that you would think the upper part of the heavens to be as it were in convulsions. 5. When all the streamings are over, the aurora commonly degenerates into a bright twilight in the north, and then gradually dies away.

The solutions of the phenomena of the aurora borealis are various. Dr. Halley has recourse to the magnetick effluvia which he supposes enter the earth near the south pole, and pervading its pores, pass out again at the same distance from the northern; and thinks, that by the concurrence of several causes, they may be capable of producing a small degree of light, either from the greater density of the matter, or from the greater velocity of its motion, after the same manner as we see the effluvia of electric bodies emit light in the dark. Monsieur de Marain endeavours to prove that it is owing to the zodiacal light, or the atmosphere of the sun, which mixing with our atmosphere, and being of an heterogeneous nature, produces the several appearances of the aurora borealis. Mr. Maier, of the academy at Petersburg, accounts for it from exhalations fermenting and taking fire in the atmosphere; and Mr. Rowning gives a very ingenious and natural solution of all the above phenomena, from such effluvia as are continually exhaled from the surface and bowels of the earth.

The aurora borealis is a very common phenomenon in countries near the pole; but there are not many upon record, as having appeared in England before that of March 1715. Since that time, however, they have been and still continue very frequent.

AURUM, *gold*, in natural history. See GOLD.

The Latin term *aurum* is chiefly used to denote certain chymical preparations, whereof gold is the principal ingredient. Such are, 1. Aurum fulminans, being a solution of gold in aqua regia, and precipitated with salt of tartar. This gives a much smarter and louder report than the common pulvis fulminans. 2. Aurum musivum or mosaicum, which is made of tin, flowers of sulphur, crude sal armoniack, and purified quicksilver,



quicksilver, by mixing and subliming the whole in a matraass. The aurum musivum will be found under the sublimed part, in the bottom of the matraass, and may be prescribed in a dose from four grains to a scruple, to kill worms in children. 3. Aurum potabile, potable gold. This is a composition made of gold, by separating its salt and sulphur, and then dissolving it in a liquor, which takes the name of tincture of gold. It is supposed to possess the virtues of a cordial and sudorifick, but these can never be ascribed to the gold, for it remains still gold, and may be separated in its own proper form by mere evaporation. 4. Aurum philosophorum, which the alchymiks hold still more simple than gold, as consisting of mercury perfectly cleared from all sulphur; but whether there be any such thing in nature, is a question not yet decided.

AUSTERE, implies a rough astringent taste.

AUSTRAL, AUSTRALIS, the same with southern. Thus austral signs are the six last signs of the zodiack; so called, because they are on the south side of the equinoctial.

AUTHENTICK, something of acknowledged and received authority. In law, it signifies something clothed in all its formalities, and attested by persons to whom credit has been regularly given. Thus, we say, authentick papers, authentick instruments.

AUTHOR, properly signifies, one who created or produced any thing. Thus God, by way of eminence, is called the author of nature, the author of the universe. The word is sometimes in the same sense as inventor: as Otto de Guericke is reported to be the author of the air-pump.

AUTHOR, in matters of literature, a person who has composed some book or writing.

AUTHORITY, in a general sense, signifies a right to command, and make one's self obeyed. In which sense, we say, the royal authority, the episcopal authority, the authority of the father, &c. It denotes also the testimony of an author; some apophthegm, or sentence of an eminent person, quoted in a discourse by way of proof or confirmation.

Authority is represented, in painting, like a grave matron sitting in a chair of state, richly clothed in a garment embroidered with gold, holding in her right hand a sword, and in her left a sceptre. By her side is a double trophy of books and arms.

AUTOCEPHALOUS, in ecclesiastical history, signifies archbishops who were independent of any patriarch.

AUTO-DE-FE, ACT OF FAITH. See ACT OF FAITH.

AUTOCHTHONES, in antiquity, an appellation importing the same with aborigines.

AUTOGRAPH, *αυτογραφον*, denotes a person's hand-writing, or the the original manuscript of any book, &c.

AUTOMATUM, or AUTOMATON, an instrument, or rather machine; which, by means of springs, weights, &c. seems to move itself as a watch, clock, &c. Such also were Archytus's flying dove, Regiomontanus's wooden eagle, &c.

AUTUMN, the third season of the year, when the harvest and fruits are gathered in. Autumn is represented, in painting, by a man at perfect age, clothed like the vernal, and likewise girded with a starry girdle, holding in one hand a pair of scales equally poised, with a globe in each; in the other, a bunch of divers fruits and grapes. His age denotes the perfection of this season, and the balance, that sign of the zodiack, which the sun enters when our autumn begins; viz. libra, ♎. See plate IV. fig. 7.

AUTUMNAL Point, is that point of the equinox, from which the sun begins to descend towards the south pole.

AUTUMNAL Signs, in astronomy, are the signs Libra, Scorpio, and Sagittarius, through which the sun passes during the autumn; marked thus ♎, ♏, ♐.

AUTUMNAL Equinox, the time when the sun enters the autumnal point. See EQUINOX.

AUX, in astronomy, the same with the apogeeum of

the ancients, or the aphelium of the moderns. It also denoted the arch of the ecliptick, intercepted between the first degree of Aries and the apogeeum.

AUXILIARY, whatever is aiding or helping to another.

AUXILIARY Verbs, in grammar, are such as help to form or conjugate others; that is, are prefixed to them, to form or denote the moods or tenses thereof; as *to have* and *to be*, in the English; *être & avoir* in the French; *ho & sono* in the Italian, &c. In the English language, the auxiliary verb *am*, supplies the want of passive verbs.

AWARD, in law, the judgment of an arbitrator, or of one who is not appointed by the law a judge, but chosen by the parties themselves for terminating the difference. See ARBITRATOR.

A-WEIGH, in navigation, the anchor is called a weigh, or a trip, when the cable, being drawn perpendicular to it, and continued to be heaved into the ship, at length weighs or trips it out of the ground.

AWL, or AUL, among shoemakers, an instrument wherewith holes are bored through the leather, to facilitate the stitching, or sewing the same. The blade of the awl is usually a little flat and bended, and the point ground to an acute angle.

AWME, or AUME, a Dutch liquid measure, containing eight steekans, or what we call a tierce, or to one sixth of a tun of France.

AWN, in botany, *arista*; the beard growing out of the husk of corn or grass.

AWNING, in the sea-language, is the hanging a sail, tarpaulin, or the like, over any part of the ship, to keep off the sun, rain, or wind.

AX, *securis*, among carpenters, an instrument wherewith to hew wood. This implement differs from the joiners hatchet, as being deeper and heavier.

AXILLA, in anatomy, the arm-pit, or the cavity under the upper part of the arm.

AXILLA, in botany, the angle formed by a branch and the stem, or a leaf and the branch.

AXILLARY, *Axillaris*, something belonging to, or lying near the axilla. Thus,

AXILLARY Artery, is that part of the subclavian branches of the ascending trunk of the aorta, which passeth under the arm-pits. See ARTERY.

AXILLARY Glands, are situated under the arm-pits, enveloped in fat, and lie close by the axillary vessels.

AXILLARY Vein, one of the subclavian veins which passes under the arm-pit, dividing itself into several branches, which are spread over the arm. See VEIN.

AXIOM, in philosophy, is such a plain self-evident, and received notion, that it cannot be made more plain and evident by demonstration; because it is itself better known than any thing that can be brought to prove it: as, that nothing can act where it is not; that a thing cannot be, and not be, at the same time; that the whole is greater than a part thereof; and that from nothing, nothing can arise.

By axioms, called also maxims, are understood all common notions of the mind, whose evidence is so clear and forcible, that a man cannot deny them, without renouncing common sense and natural reason.

The rule whereby to know an axiom, is this; Whatever proposition expresses the immediate clear comparison of two ideas without the help of a third, is an axiom. But if the truth does not appear from the immediate comparison of two ideas, it is no axiom.

These sort of propositions, under the name of axioms, have, on account of their being self-evident, passed not only for principles of science, but have been supposed innate, and thought to be the foundation of all our other knowledge; though, in truth, they are no more than identick propositions: for to say that all right angles are equal to each other, is no more than saying, that all right angles are right angles, such equality being implied in the very definition. All consideration of these maxims, therefore, can add nothing to the evidence or certainty of our knowledge of them; and how little they influence the rest of our knowledge, how far they are from being the foundation of it,



it, as well as of the truths first known to the mind, Mr. Locke, and some others have undeniably proved.

According to Bacon, it is impossible that axioms, raised by argumentation, should be useful in discovering new works; because the subtilty of nature far exceeds the subtilty of arguments: but axioms, duly and methodically drawn from particulars, will again easily point out new particulars, and so render the sciences active.

The axioms in use being derived from slender experience, and in a few obvious particulars, are generally applied in a corresponding manner. No wonder, therefore, they lead us to few particulars; and if any instance, unobserved before, happen to turn up, the axiom is preserved by some trifling distinction, where it ought rather to be corrected.

AXIOM is also an established principle in some art or science. Thus it is an established axiom in physics, that nature does nothing in vain: so it is in geometry, that if to equal things you add equals, the sums will be equal.

It is an axiom in opticks, that the angle of incidence is equal to the angle of reflection, &c. In which sense too, the general laws of motion are called axioms: whence it may be observed, that these particular axioms are but deductions from certain hypotheses.

AXIS, properly signifies a line, or long piece of iron or wood, passing through the centre of a sphere, and about which the sphere revolves.

Axis of the World is an imaginary right line conceived to pass through the centre of the earth, from one pole to another, about which the sphere of the world, according to the Ptolemaick system, revolves in its diurnal motion.

Axis of a Planet, is that line drawn through its centre, about which the planet revolves. The sun, together with all the planets, except Mercury and Saturn, are known to revolve round their respective axis by observation. The earth's axis during its revolution round the sun, remains always parallel to itself, and is inclined to the plane of the ecliptick, making therewith angles of  $66\frac{1}{2}$  degrees.

The axis of the equator, horizon, ecliptick, zodiack, &c. are right lines drawn through the centres of those circles, perpendicular to their planes.

Axis, in geometry, the straight line in a plain figure, about which it revolves, to produce or generate a solid: thus, if a semi-circle be moved round its diameter at rest, it will generate a sphere, the axis of which is that diameter.

Axis, in astronomy, is an imaginary right line supposed to pass through the centre of the earth, and the heavenly bodies, about which they perform their diurnal revolutions.

Axis, in mechanicks. The axis of a balance is that line about which it moves, or rather turns about. Axis of oscillation is a right line parallel to the horizon, passing through the centre about which a pendulum vibrates.

Axis of Incidence, in diopticks, is a line perpendicular to the refracting surface in the point of incidence, and in the medium through which the ray of incidence passes. Thus if AB (*plate VII. fig. 6.*) represent a ray of incidence, and *abcd*, a refracting surface, then will FB, be the axis of incidence.

Axis, in opticks, is that particular ray of light coming from any object which falls perpendicularly on the eye.

Axis, in conick-sections, a right line dividing the section into two equal parts, and cutting all its ordinates at right angles.

Axis in peritrochio, one of the five mechanical powers, consisting of a peritrochium or wheel concentrick with the base of a cylinder, and moveable together with it about its axis.

The wheel and its axis move together in this machine, and on that account, it is evident that, in one turn of the wheel, when the power P (*see plate VII. fig. 5.*) descends a length equal to the circumference of the wheel, the weight W will be raised an height equal to

the circumference A; by the winding of the rope, which carries the weight upon the said axis.—And because, when there is an equilibrium between two weights, as W and P, there must be a reciprocal proportion between the masses and velocities; W will be to P, as the circumference of the wheel is to that of the axis (supposing the thickness of the rope to be inconsiderable), or as the semi-diameter of the wheel to the semi-diameter of the axis; for the semi-diameters of different circles are in the same proportion to one another as their circumferences.

The axis in peritrochio may also be considered as a lever of the first kind: for the fulcrum will be in the middle of the axis A. If, therefore, lines be drawn from the middle of the axis to the power and weight, parallel to the horizon, the radius or semi-diameter of the wheel will be the distance of the power, and the radius of the axis the distance of the weight; and when these radii are reciprocally as the weight and power, the machine will be in equilibrio. The wheel and axis therefore is nothing more than a perpetual lever.

We have remarked above, that the thickness of the rope carrying the weight, is supposed to be inconsiderable; but as this is never the case in practice, when the weight is considerable, it will be necessary to make a proper allowance for it; and this is done by adding the semi-diameter of the rope to the semi-diameter of the axis; for the weight really hangs half the thickness of the rope beyond the axis. It is also necessary that the line of direction in which the power acts be a tangent to the wheel; for otherwise it will not produce the same effect, as the lever to which it is applied will be shortened.

If a plumb line be applied to any part of the circumference of the wheel above the horizontal radius, it will form a chord-line, connecting two points in the circumference of the wheel; and if this chord be bisected by a radius drawn from the centre, the part of that radius intercepted between the centre and the chord will be the length of the lever on which the power acts in that position.

The machine, represented by the figure, is a model (made by a scale of half an inch to a foot) of such an axle and wheel, as is often made use of to draw water out of a well, by means of a power drawing by a rope applied to the circumference of one of the wheels of the machine, or by pressing down successively the handles E, F, G, H, I, K, whilst another rope or chain is wound up upon the axis A or B, a bucket hanging at it instead of the weight W.

Here, in the experiment, one pound hanging at the circumference of the biggest wheel CD, will keep in equilibrio, 12 pounds hanging at the smallest axis A, or 6 pounds at the axis B, and only 3 pounds upon the circumference TV. In the same manner, when the weight hanging at the axis continues in the same place, and to be of the same quantity, viz. 12 pounds; then the power, which, at the circumference of the wheel CD, is equal to 1 pound, must be equal to  $1\frac{1}{2}$  pound, if to be applied at SR; but if it be applied at one of the handles at the distance of  $\frac{1}{4}$  of an inch from the circumference of the wheel CD (which is the same as if a new wheel was added of  $\frac{1}{2}$  an inch more in diameter); then a power, equal to more than  $\frac{1}{4}$  of a pound, will keep the machine in equilibrio, and raise it if the intensity be increased ever so little.

Axis, in architecture, spiral axis, is the axis of a twisted column drawn spirally, in order to trace the circumvolutions without.

Axis of the Ionick capital, is a line passing perpendicularly through the middle of the eye of the volute.

Axis of a Vessel, is an imaginary right line passing through the middle of it, perpendicularly to its base, and equally distant from its sides.

Axis, in anatomy, the second vertebra of the neck, so called from the head's turning on it like an axis.

AXLE, or AXLE-TREE, the same with axis.

AXUNGIA, in a general sense, denotes old lard, or the driest and hardest of any fat in the bodies of animals: but more properly, it signifies only hog's-lard.



*AXUNGIA folis*, in natural history, the same with the Silesian earth.

*AXUNGIA vitri*, SANDIVER, or SALT of glass, a kind of salt which separates from the glass while it is in fusion. It is of an acrimonious and biting taste. The farriers use it for cleansing the eyes of horses. It is also made use of for cleansing the teeth; and is sometimes applied to running ulcers, the herpes; or the itch, by way of deficcative.

AXYRIS, in botany, a genus of the monœcia triandria class. The calix of the male is tripartite; it has no corolla. The calix of the female consists of two leaves; it has two styli, and one seed. The species are four, none of them natives of Britain.

AYENIA, in botany, a genus of the gynandria pentandria class. The calix has two leaves; the petals are in the form of a star, with long unguis; and the capsule has five cells. There are three species, all natives of the West-Indies.

AYRY, or AERY of hawks, a nest or company of hawks, so called from the old French word *aire*, which signified the same.

AZAB, in the Turkish armies, a distinct body of soldiery, who are great rivals of the Janizaries.

AZALEA, in botany, a genus of the pentandria monogynia class. The corolla is bell-shaped; the stamina are inserted into the receptacle; and the capsule has five cells. The species are six, most of them natives of America.

AZAZEL, the scape-goat, in Jewish antiquity.

AZED, in the materia medica, a kind of camphor.

AZIMUTH, in astronomy, an arch of the horizon, intercepted between the meridian of the place and the azimuth, or verticle circle passing through the centre of the object, which is equal to the angle of the zenith, formed by the meridian and vertical circle; or it is found by this proportion, as the radius to the tangent of the latitude of the place, so is the tangent of the sun's or star's altitude, for instance, to the co-sine of the azimuth from the south, at the time of the equinox.

It is found also by the following rule. From half the sum of the three sides, subtract the complement of the sun's declination, or the side opposite the angle sought, and note the remainder; then set down the arithmetical complements of the sine of the complements of altitude and latitude; and place under those the sine of the half sum of the sides, and the sine of the noted difference; then will half the sum of these four logarithms be the cosine of half the azimuth required.

For instance; suppose the latitude in *per* reckoning be 40 degrees north, and the sun's altitude observed 20 degrees, and his declination 20 degrees north, what will his azimuth be?

70° : 0'	Comp. of Decl <sup>n</sup> .			
50 : 0	Comp. of Lat.	-	-	0.1157460
70 : 0	Comp. of Alt.	-	-	0.0270142
<hr/>				
190 : 0	Sum of the sides			
<hr/>				
85 : 0	$\frac{1}{2}$ Sum	-	-	9.9983442
<hr/>				
15 : 0	Diff. of $\frac{1}{2}$ sum and comp. of declination	-	-	9.4129962
<hr/>				
			Sum =	19.5541006
<hr/>				
53 : 11	+ = sine comp. half Sum			9.7770503

therefore, 53° : 11' being doubled gives 106° : 22' for the sun's azimuth required.

Magnetical AZIMUTH, an arch of the horizon, intercepted between the azimuth, or verticle circle, passing through the centre of any heavenly body, and the magnetical meridian. This is found by observing the object with an azimuth-compass.

AZIMUTH-compass, an instrument adapted to find, in a more accurate manner than by the common sea-compass, the sun or stars magnetical amplitude, or azimuth.

The cover of the wooden box being taken off, the

compass is in a condition to be made use of in the binnacle, when the weather is moderate: but if the sea runs high, as the inner box is hung very free upon its centres, (the better to answer its other purposes) it will be necessary to slacken the milled nut, placed upon one of the axes that supports the ring, and to lighten the nut on the outside that corresponds to it. By this means the inner box and ring will be lifted up from the edges, upon which they rest, when free; and the friction will be increased, and that to any degree necessary, to prevent the too great vibrations, which otherwise would be occasioned by the motion of the ship.

To make the compass useful in taking the magnetick azimuth, or amplitude of the sun and stars, as also the bearings of headlands, ships, and other objects at a distance, the brass edge, designed at first to support the card, and throw the weight thereof as near the circumference as possible, is itself divided into degrees and halves; which may be easily estimated into smaller parts, if necessary.

The divisions are determined by means of a cat-gut line, stretched perpendicularly with the box, as near the brass edge as may be, that the parallax, arising from a different position of the observer, may be as little as possible. Underneath the card are two small weights, sliding on two wires, placed at right angles to each other; which being moved nearer to, or further from, the centre, counterbalance the dipping of the card in different latitudes, or restore the equilibrium of it, where it happens by any other means to be got too much out of level.

An index at the top of the inner box, is also added, which may be put on and taken off at pleasure; and serves for all altitudes of the object. It consists of a bar, equal in length to the diameter of the inner box, each end being furnished with a perpendicular stile, with a slit parallel to the sides thereof; one of the slits is narrow, to which the eye is applied, and the other is wider, with a small cat-gut stretched up the middle of it, and from thence continued horizontally from the top of one stile to the top of the other. There is also a line drawn along the upper surface of the bar. These four, viz. the narrow slit, the horizontal cat-gut thread, the perpendicular one, and the line on the bar, are in the same plane, which disposes itself perpendicular to the horizon, when the inner box is at rest, and hangs free. This index does not move round, but is always placed on, so as to answer the same side of the box.

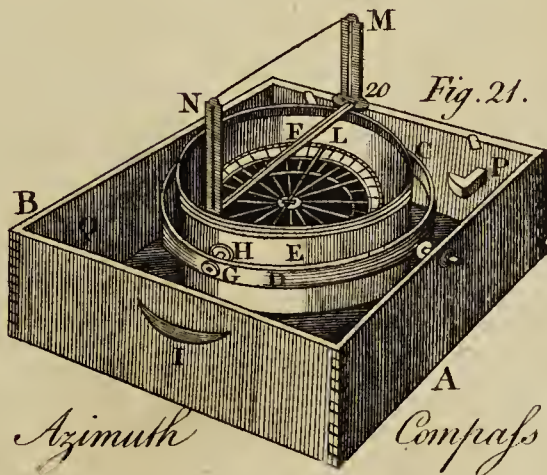
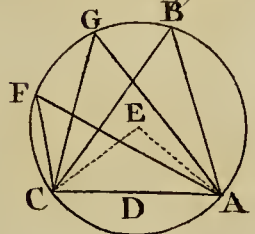
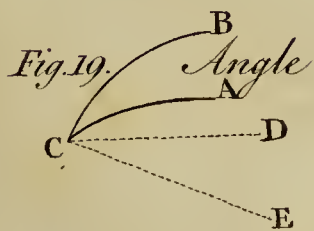
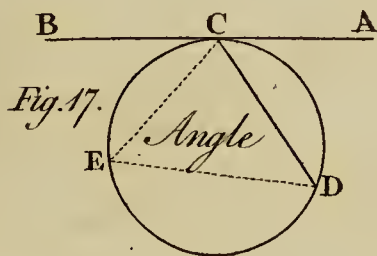
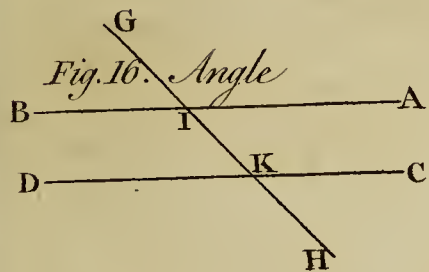
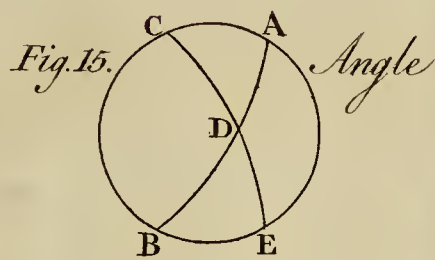
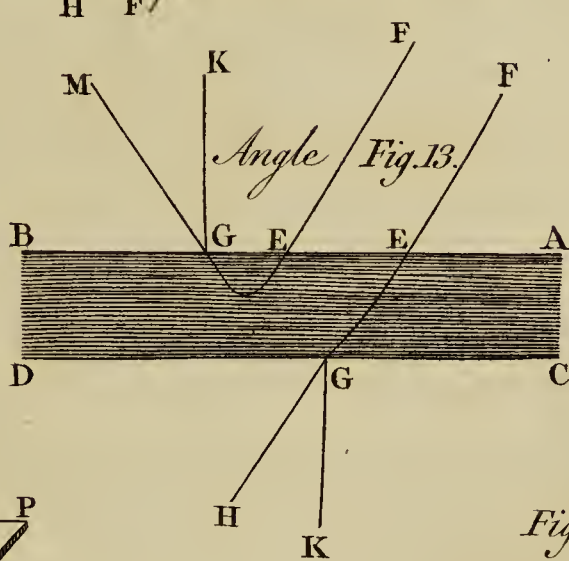
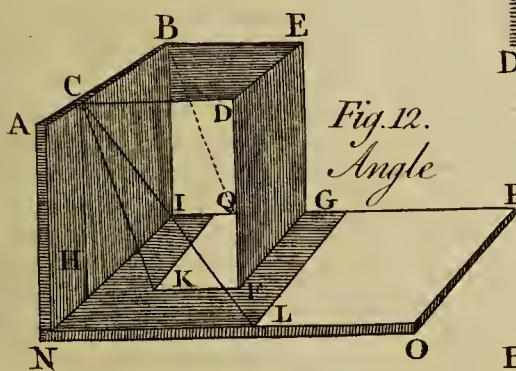
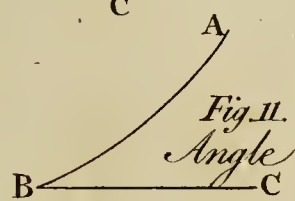
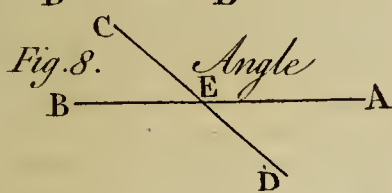
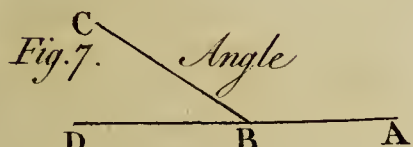
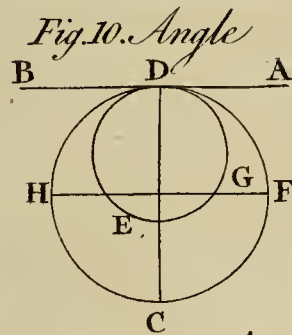
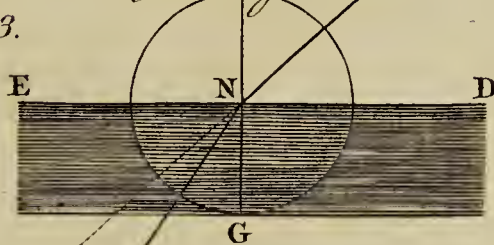
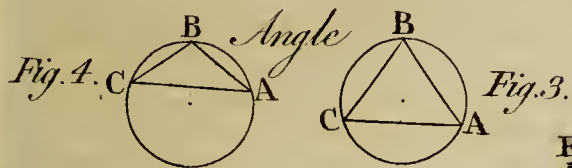
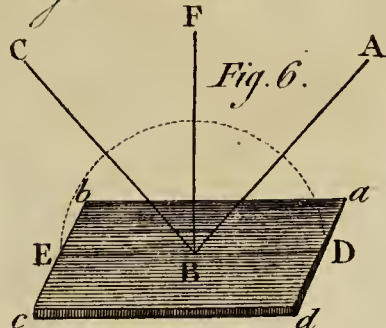
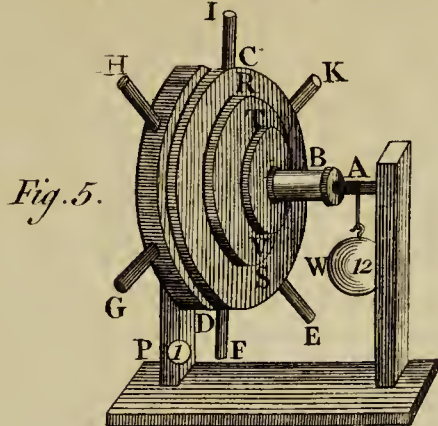
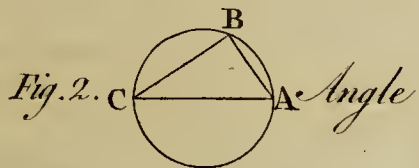
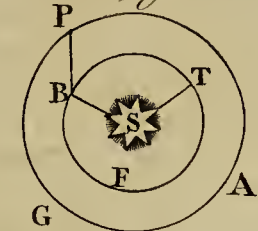
When the sun's azimuth is desired, and his rays are strong enough to cast a shadow, turn about the wooden box, till the shadow of the horizontal thread, or (if the sun be too low) till that of the perpendicular thread, in one stile, or the light through the slit in the other, falls upon the line in the index bar, or vibrates to an equal distance on each side of it, gently touching the box, if it vibrates too far: observe, at the same time, the degree marked upon the brass edge by the cat-gut line.

In counting the degree for the azimuth, or any other angle that is reckoned from the meridian, make use of the outward circle of figures upon the brass edge; and the situation of the index bar, with regard to the card and needle, will always direct upon what quarter of the compass the object is placed. But if the sun does not shine out sufficiently strong, place the eye behind the narrow slit in one of the stiles, and turn the wooden box about, till some part of the horizontal, or perpendicular thread appears to intersect the centre of the sun, or vibrate to an equal distance on each side of it, using smoked glass next the eye, if the sun's light is too strong. In this method, another observer will be generally necessary, to note the degree cut by the nonius, at the same time the first gives notice that the thread appears to split the object.

It is necessary, in case of the sun's amplitude, to take care to number the degree by the help of the inner circle of figures on the card, which are the complements of the outer to 90°; and, consequently, shew the distance from east or west.

The











The azimuth of the stars may also be observed by night, a proper light serving equally for one observer to see the thread, and the other the degree upon the card. It may not be amiss to remark further, that, in case the inner box should lose its equilibrium, and, consequently, the index be cut off the plane of a vertical circle, an accurate observation may still be made, provided the sun's shadow be distinct; for, by observing first with one end of the index towards the sun, and then the other, a mean of the two observations will be the truth.

*Plate VII. fig. 21.* is a perspective view of the compass, when in order for observation; the point of view being the centre of the card, and the distance of the eye two feet.

AB is the wooden box; near the upper edge of which, above A is a milled nut, and another opposite to it, by means whereof the axle of the inner box and ring are taken from their edges, on which they move, and the friction increased, when necessary.

CD is the ring that supports the inner box.

EF is the inner box; and

GH is one of its axes, by which it is suspended on the ring CD.

I is a place cut out in the wood, serving as an handle.

The magnet or needle appears passing through the centre, together with a small brace of ivory, that confines the cap to its place.

The card is a single varnished paper, reaching as far as the outer circle of figures, which is a circle of thin brass; the edge whereof is turned down at right angles to the plane of the card, to make it more stiff.

L is a cat-gut line, drawn down the inside of the box, for determining the degree upon the brass edge.

MN is the index bar, with its two stiles and cat-gut threads; which being taken off from the top of the box, is placed in two pieces, P and Q, notched properly to receive it.

**AZIMUTH Dial**, one whose style or gnomon is at right angles to the plane of the horizon.

**AZIMUTH Circles**, called azimuths, or vertical circles, are great circles of the sphere, intersecting each other in the zenith and nadir, and cutting the horizon at right angles in all the points thereof.

**AZOGA SHIPS**, are these Spanish ships commonly called the quicksilver ships, from their carrying quicksilver to the Spanish West-Indies, in order to extract the silver out of the mines of Mexico and Peru. Unless it is on the king of Spain's account, strictly speaking, these ships carry no goods.

**AZONI**, in ancient mythology, a name applied by the Greeks to such of the gods as were deities at large,

and which the Latins called *dii communes*. Of this sort were the Sun, Mars, Luna, &c.

**AZOTH**, in ancient chymistry, the first matter of metals, or the mercury of a metal; more particularly that which they call the mercury of philosophers, which they pretend to draw from all sorts of metallick bodies.

**AZURE**, in a general sense, the blue colour of the sky. See **SKY**, and **BLUE**.

**AZURE**, among painters, the beautiful blue colour, with a greenish cast, prepared from the lapis lazuli, generally called ultramarine.

With greater propriety, however, azure signifies that bright blue colour prepared from the lapis armenus, a different stone from the lapis lazuli, though frequently confounded together. This colour is, by our painters, commonly called Lambert's blue.

**AZURE**, in heraldry, the blue colour in the arms of any person below the rank of a baron. In the escutcheon of a nobleman, it is called saphire; and in that of a sovereign prince, Jupiter. In engraving, this colour is expressed by lines, or strokes drawn horizontally.

**AZURIUM**, the name of a chymical preparation from two parts of mercury, one of sulphur, and a fourth of sal ammoniac, mixed in a mortar, put into a glass vessel, and set over the fire till a blueish smoke arises, &c.

**AZYGOS**, in anatomy, a vein rising within the thorax on the right side, having no fellow on the left; whence it is called azygos, or vena sine pari.

It is extended through the right side of the cavity of the thorax, and being descended to the eighth or ninth vertebra, it then begins to keep the middle, and sends forth on each side intercostal branches to the interstices of the eight lowest ribs; being then divided into two branches, of which the larger descends to the left, betwixt the processes of the diaphragm, and is inserted sometimes into the cava, above or below the emulgent, but oftener joined to the emulgent itself. The other, which goes down on the right side, enters the cava, commonly a little above the emulgent, but is very seldom joined to the emulgent itself.

**AZYMITES**, in ecclesiastical history; Christians who administer the eucharist with unleavened bread. This is an appellation given by Cerularius, to those of the Latin church, upon his excommunicating them in the eleventh century. The Armenians and Maronites, who use unleavened bread in their office, are also called by the name of *Azymites*.

**AZYMOUS**, something unfermented, as bread, &c. made without leaven. Sea-biscuit is of this kind; and therefore, less wholesome than bread that has been fermented, according to Galen and others.



# B.

## B A C

**B**, The second letter of the alphabet, and of most others, both ancient and modern, except the old Irish; where B is the first, and A the seventeenth; and in the Abyssinian, in which B is the ninth, and A the thirteenth.

B is the first consonant, and first mute, and is supposed in its pronunciation, to resemble the bleating of a sheep; on which account the Egyptians are said to represent the sound of B by that animal.

B is also one of those letters which the Eastern grammarians call labial, because the principal organs employed in its pronunciation are the lips. It has a near affinity with the other labials P and V, and is often used for P, both by the Armenians, and other Orientals; as in *Betrus* for *Petrus*, *apsens* for *absens*, &c. and by the Romans for V, as in *amabit* for *amavit*, *berna* for *verna*, &c. whence arose that jest of Aurelian on the emperor Bonosus, *Non ut vivat natus est, sed ut bibat*.

B, among the ancients, was a numeral letter, and used by the Greeks and Hebrews to denote 2; but by the Romans 300; when a line was drawn above it, thus B, it stood for 3000; and with a kind of accent below it, for 200.

B, as an abbreviation, in musick, stands for the tone above A, as B<sup>b</sup>, or <sup>b</sup>B, does for B flat, or the semitone major above A: B also stands for bass, and B. C. for *basso continuo*, or thorough bass. B, in the chymical alphabet, signifies mercury. B. A. stands for bachelor of arts; B. L. for bachelor of laws; and B. D. for bachelor of divinity. The Romans used B for Brutus; and B. F. for *bonum factum*.

BAAL, an Hebrew and Chaldaick word signifying lord, or mighty. It was the name of the idol of the Moabites and Phœnicians. The Grecians, who were accustomed to take the eastern divinities for their own, called this idol Jupiter, and sometimes Mars. The Phœnicians adored the sun under the names of Baal and Moloch. It is thought this idol was the first invented by superstition, and the original worship of idolatry.

BABBLING, among hunters, is when the hounds are too busy after they have found a good scent.

BABOON, in natural history, a large kind of ape, common in the East and West Indies. The face is naked, but the back part of the head is hairy.

BABYLON, a celebrated city of antiquity, supposed to have been situated on the river Euphrates, though not on its present channel, in 44° east longitude, and 32° north latitude. But of this once so flourishing a city, there are now no remains; nor even the place where it stood certainly known.

BABYLON was also an ancient city of Egypt, supposed to have stood where Grand Cairo does at present.

BABYLONISH, or BABYLONIAN, something belonging, or peculiar to Babylon: thus, we meet with Babylonian epocha, hour, &c. See the articles EPOCHA, HOUR, &c.

BACCHANALIA, feasts celebrated in honour of Bacchus by the ancient Greeks and Romans; of which the two most remarkable were called the *greater* and *less*. The latter, called *lenæa*, from a word signifying a *wine-press*, were a preparation for the former, and were held in the open fields about autumn; but the greater, called *Dirnyfia*, from one of the names of Bacchus, were celebrated in the city, about the spring-time. Both these feasts were accompanied with games, spectacles, and theatrical representations; and it was at this time the poets contended for the prize of poetry. Those who were initiated into the celebration of the feasts, represented, some Silenus, others Pan, others

## B A C

satyrs; and in this manner appeared in publick night and day, counterfeiting drunkenness, dancing obscenely, committing all kinds of licentiousness and debauchery, and running over the mountains and forests, with horrible shrieks and howlings, crying out, *Io Bacche*. Livy informs us, that during the Bacchanalian feasts at Rome, such shocking disorders were practised under the cover of the night, and those who were initiated were bound to conceal them with an oath, attended with horrid imprecations, that the senate suppressed them first in Rome, and afterwards throughout all Italy.

BACCHARIS, in botany, a genus of the syngenesia polygamia superflua class. The receptacle is naked, and the pappus bristly; the calix is imbricated and cylindrical; the hermaphrodite floscules are intermixed with the female ones. The species are seven, all natives of warm climates.

BACCHIUS, in ancient poetry, a kind of foot composed of a short syllable and two long ones, as the word [ävārī]. It takes its name from the God Bacchus, because it frequently entered into the hymns composed in his honour.

BACCIFEROUS, an epithet added to the names of any trees, shrubs, or plants, that bear berries, as byrony, dwarf, honey-suckle, lilly of the valley, asparagus, butcher's broom, night-shade, solomon's seal, and many others.

BACK, in anatomy. See the article DORSUM.

BACK-ASTERN, in rowing, is to row a vessel with her stern, or hinder part foremost, contrary to her usual motion.

BACKING the sails, in navigation, is to arrange them in a situation that will force the ship to retreat, or move backwards: this is only done in narrow channels, when a ship is carried along sideways by the tide or current, and wants to avoid any thing that may interrupt her progress, as shoals, vessels at anchor, &c. or in the line of battle, when a ship wants to be immediately opposite to another with which she is engaged.

BACK-PAINTING, the art of painting mezzotinto prints, pasted on glass, with oil colours; which consists chiefly in fastening the print upon a piece of crown glass of such a size as fits the print.

It is performed thus: take your print and lay it in clean water for forty-eight hours, provided the print be on very strong, close, and hard gummed paper; but if the paper be open, soft, and spongy, two hours will be sometimes sufficient. The paper or picture having been sufficiently soaked, take it out and lay it upon two sheets of paper, and cover it with two more; and let it lie there a little to suck out the moisture. In the mean time, take the glass the picture is to be put upon, and set it near the fire to warm; take Strasburg turpentine, warm it over the fire till it is grown fluid; then with a hog's hair brush spread the turpentine very smoothly and evenly on the glass.

Afterwards, take the mezzotinto print from between the papers, and lay it upon the glass; beginning first at one end, rubbing it down gently as you go on, till it lie close, and there be no wind bladders between. Then, with your fingers, rub or roll off the paper from the back-side of the print, till it looks black, i. e. till you can see nothing but the print, like a thin film, left upon the glass, and set it by to dry. When it is dry, varnish it over with some white transparent varnish, that the print may be seen through it, and then it is fit for painting. The utmost care will be necessary in rubbing or rolling the paper off the print, so as not to tear it, especially in the light parts.



Instead of soaking your prints two days and two nights, you may roll them up and boil them for about two hours, more or less, according to the quality of the paper, in water, and that will render it as fit for rubbing, rolling, or peeling, as the other way. This being done, and your oil colours prepared, ground very fine, and tempered up very stiff, lay on the back-side of the transparent prints such colours as each particular part requires; letting the master-lines of the prints still guide your pencil, and so each particular colour will lie fair to the eye on the other side of the glass, and look almost as well as a painted piece, if it be done neatly. The shadows of the print are generally sufficient for the shadow of every colour; but if you have a mind to give a shadow by your pencil, then let the shadows be laid on first, and the other colours afterward. In laying on colours in this kind of back-painting, you need not be curious as to the laying them on smooth.

This is not at all requisite here, where the chief aim is only to have the colours appear well on the fore side of the print; and therefore the only care to be used in this work, is to lay the colours on thick enough, that its body may strike the colour of it plainly through the glass.

**BACKSTAFF**, a name formerly given to a sea-quadrant invented by Capt. Davis; because the back of the artist is turned towards the sun at the time of observation. See Davis's **QUADRANT**.

**BACK-STAYS**, in naval affairs, ropes that reach from the topmast heads down to the outides of the ship, where they are stretched extremely tight: their use is to support the masts, and prevent their bending too much when they are pressed by a weight of sail.

**BACON's Philosophy**, the philosophy proposed and recommended by Lord Bacon.

That great genius was born in the year 1560, and gave marks in his youth of what his manhood would produce. Queen Elizabeth was an admirer of his remarkable sagacity. He studied the Aristotelian philosophy at Cambridge, and, before he was sixteen years of age, discovered the absurdity of that jargon in vogue at that time. He afterwards applied himself to the study of the law; and his merit raised him to the dignity of lord chancellor, under king James I. He was accused of bribery; and, the king refusing him protection, was fined by the house of lords, stripped of his chancellorship, and cast into prison. He was soon after reinstated in his honours and fortunes; but what he had undergone gave him a dislike to business, and increased his passion for study. At last he died aged 66 years, poor, and in very mean circumstances.

Lord chancellor Bacon has contributed more to the advancement of learning than most men: he saw the imperfection of the philosophy of the schools, and taught the only way to amend it. This great man, indeed, did not know nature; but he knew and pointed out all the ways that lead to her. He entertained an early contempt for what the universities called philosophy; and did every thing in his power to prevent societies instituted for the improvement of human reason, from continuing to spoil it by a heap of impertinent terms, substantial forms, &c. which not only had made ignorance to be revered, but was, by a ridiculous mixture with religion, rendered sacred.

He composed two works with a design to improve the sciences, and carry them to perfection. In the first, intitled *de Augmentis Scientiarum*, he shews the state of learning, and points out a method of carrying it to greater perfection; but adds, that we must never hope to carry our discoveries to any great length, unless other methods were pursued than those then in use. He shews that the logick then taught in the schools, was fitter for wrangling than to direct the mind in its search after truth. Aristotle, says he, from whom we have this art, has proceeded on wrong principles; he has made his physicks conformable to his logick, instead of making his logick conformable to his physicks; and thus overturning the order of nature, has subjected the end to the means.

To correct the faults in the common logick, Bacon composed a second work, intitled *Organum Scientiarum*,

wherein he has taught a new logick, the principal end of which is to shew how to make a good induction, as the end of Aristotle is how to make a good syllogism. Bacon looked on this as his master-piece, and spent eighteen years in composing it. Nor was the cause of our errors hid from this great man; he saw that our ideas were operations of the mind; and that, in order to discover truth, they must be directed in a new method.

He frequently repeats this advice in the work just mentioned. But who, in an age so prejudiced in favour of the jargon of the schools, and the notions of innate ideas, listened to his doctrine? Who did not look on his new method of improving the human understanding, as a chimerical project? The method Bacon proposed was too perfect to be accepted at once: errors of long standing maintain their post with some obstinacy; and the Cartesian philosophy was embraced, because it admitted some of the former errors. Besides, Lord Bacon's employments took up much of his time, and prevented him from carrying into execution himself the advice he gave to others: whereas Descartes gave himself up entirely to philosophy; and, being a man of a very lively and fruitful imagination, has substituted in the room of the errors of the schools, others of a more seducing nature.

The application Lord Bacon made to the sciences in general did not hinder him from applying himself to some in particular; and as he thought natural philosophy the basis of all the other sciences, he principally applied himself to bring that to some degree of perfection: but in this he acted like some great architects, who, scorning to work after others, begin with pulling every thing down, and raise their building on a plan entirely new. He, like these, never thought once about embellishing or repairing what had been already begun by others; but proposed to establish a new system of physicks, without making any use of what had been left us by the ancients, whose principles he suspected. To accomplish this great design, he resolved to publish a physical treatise every month; and began with one upon the winds: he afterwards published one on heat; another on motion; and, at last, one on life and death.

But as it was impossible for a single man to give a complete system of physicks in general, with equal exactness, after having given directions to serve as a rule for those who were desirous of proceeding on his principles, he contented himself with drawing the out-lines of four other treatises, and furnished materials for them in a work intitled *Sylva Sylvarum*, wherein he has collected a vast number of experiments to serve as a foundation for his new physicks.

The honourable Mr. Walpole; calls him the prophet of arts, which Newton was afterwards to reveal; and adds, that his genius and his works will be universally admired as long as the science exists.—“As long as ingratitude and adulation are despicable, so long shall we lament the depravity of this great man's heart.—Alas! that he who could command immortal fame, should have stooped to the little ambition of “power!” Pope has these two remarkable lines on him.

“If parts allure thee think how Bacon shin'd,  
“The wisest, brightest, meanest of mankind.”

His works, which are the glory of our nation, are collected together, and printed in four volumes folio; the Lord Verulam died at the Earl of Arundel's house, at Highgate, the 9th of April, 1626, and was privately buried in the chapel of St. Mary's church, within the precincts of Old Verulam, in the chancel of which church sir Thomas Meautys, once his secretary, and afterwards clerk of the council, caused a neat monument of white marble to be erected.

**BACULE**, in fortification, a kind of portcullis, or gate, made like a petful, with a counterpoise, and supported by two strong pieces of timber. It is usually placed before the corps de guard, not far from the great gate of the place.

**BACULOMETRY**, the art of measuring access-



fible or inaccessible heights, by the help of baculi, staves, or rods. See the article *ALTITUDE*.

**BADGE**, in naval architecture, an ornament placed on the outside near the stern, containing either a window for the convenience of the cabin, or the representation of one: it is commonly decorated with marine figures, martial instruments, &c.

**BADGER**, in natural history, the name of an animal very common in most parts of England.

**BADGER**, in our old law-books, one that was licensed to buy corn in one place, and sell it at another, without incurring the penalty of an engrosser.

**BADIANE**, or **BANDIAN**, the seed of a tree which grows in China, and smells like anniseed. The Chinese, and the Dutch in imitation of them, sometimes use the badiane to give their tea an aromatick taste.

**BÆTYLIA**, anointed stones, worshipped by the Phœnicians, by the Greeks before the time of Cecrops, and by other barbarous nations. They were commonly of a black colour, and consecrated to some god, as Saturn, Jupiter, the Sun, &c.

**BAFFETAS**, or **BASTAS**, a cloth made of coarse white cotton-thread, which comes from the East Indies. That of Surat is the best.

**BAG**, in commerce, implies a certain quantity of some particular commodity. A bag of almonds is about three hundred weight; of aniseeds from three to four hundred, &c.

**BAG**, among farriers, is when, in order to retrieve a horse's lost appetite, they put in an ounce of asa-fœtida, and as much powder of favin, into a bag, to be tied to the bit, keeping him bridled for two hours, several times a day; as soon as the bag is taken off he will fall to eating. The same bag will serve a long time.

**BAGGAGE**, in military affairs, implies the cloaths, tents, utensils of divers sorts, and provisions, belonging to an army.

**BAGNIO**, an Italian word, signifying a bath. We use it for a house with conveniences of sweating, cupping, bathing, &c. and sometimes for worse purposes.

**BAGNOLIANS**, in church history, a sect of hereticks, who rejected the Old Testament, and part of the New; held the world to be eternal, and affirmed that God did not create the soul when he infused it into the body. They were in reality Maniches, but somewhat despised their errors.

**BAGPIPE**, the name of a well known musical instrument of the wind kind, greatly used in Scotland, Ireland, and the northern parts of England.

**BAGUETTE**, in architecture, signifies a small round moulding, something less than the astragal.

**BAHAR**, or **BARRE**, in commerce, weights used in several parts of the East Indies. The Bahar is of two kinds, distinguished by the epithets great and little. The great Bahar is about five hundred and twenty-four pounds; and the little Bahar, four hundred and thirty-four pounds, nine ounces, avoirdupois weight.

**BAIL**, in law, implies the setting at liberty a person arrested or imprisoned, upon an action either civil or criminal, under sureties taken for his appearance at a time and place assigned; and is either common or special.

*Common BAIL*, is in actions of small consequence, or slight proof, when almost any sureties are taken.

*Special BAIL*, is that given in cases of greater importance, where it is required that the parties be subsidy men at least, and their circumstances equal to the matter in question.

**BAIL**, or **BALE**, in the sea-language. The seamen call throwing the water by hand, out of the ship or boat's hold, *bailing*.

**BAILIFF**, an officer appointed for the administration of justice within a certain district called a Bailiwick.

**BAILIFF-ERRANT**, such as are appointed by the sheriff to go up and down the country, to serve writs and warrants, summon county courts, sessions, assizes, and the like

**BAILIFF** also implies a person who has the care and direction of a farm, manor, &c.

**BAILIWICK**, that liberty which is exempted from the sheriff of the county; over which liberty the lord thereof appoints his own bailiff, with the like power within his precinct, as an under-sheriff exercises under the sheriff of the county: or it signifies the precinct of a bailiff, or the place within which his jurisdiction is terminated.

**BAIOCCO**, a copper coin current at Rome, ten of which make a julio, and an hundred a Roman crown.

**BAIRAM**, in the Mahometan customs, a yearly festival of the Turks which they keep after the fast of Ramazan.

**BAKING**, the art of preparing bread.

**BALANCE**, *Libra*, one of the six simple powers in mechanicks, principally used in determining the equality or difference of weights in heavy bodies, and consequently their masses or quantities of matter.

The balance is of two kinds, the ancient and the modern.

The ancient, or Roman, called also the *statera Romana*, or steel-yard, consists of a lever or beam, moveable on a centre, and suspended near one of its extremities: the bodies to be weighed are applied on one side of the centre, and their weight is shewn by the division marked on the beam, where the weight, which is moveable along the lever, keeps the steel-yard in equilibrio. This balance is still frequently used in weighing heavy bodies.

The modern balance now generally used, consists of a lever or beam suspended exactly in the middle, having scales or basons hung to each extremity.

*Hydrostatick BALANCE*, an instrument contrived to determine accurately the specific gravity of both solid and fluid bodies.

As the learned Mr. s'Gravesende has greatly improved the common hydrostatick balance, and rendered it more accurate and expeditious, we shall give the reader a description of it, according to the improvements of this ingenious author.

The figure of this machine (*plate VIII fig. 3.*) represents the balance in its hydrostatick use. We shall first describe the machine; then shew the new contrived artifice for exactness; and lastly, give an instance of its universal use. VCG is the stand or pillar fixed in the table. From the top at A hangs, by two filken strings, the horizontal piece or bar BB; from which is suspended, by a ring, at *i*, the fine beam of a balance *l*, which is kept from descending too low on either side, by the gentle springing piece X y z, fixed on the supporter M. The harness is annulated at *o*, to shew distinctly the perpendicular position of the examen, by the small pointed index fixed above it. The strings by which the balance is suspended passing over two pulleys, one on each side the piece at A, go down to the bottom on the other side, and are hung over the hook, by means of a screw P, which is moveable about one fourth of an inch backwards and forwards, and therefore the balance may be raised or depressed as much. But, if a greater elevation or depression be required, the sliding piece S, which carries the screw P, is readily moved to any part of the square brass rod V K, and fixed by means of a screw.

Having thus provided for the motion of the balance, the rest of the apparatus is as follows: HH is a small table fixed upon a piece D, under the scales *d* and *e*, and moveable up and down in a long slit in the pillar above C, and fastened at any part with the screw behind. At the point in the middle of the bottom of each scale, is hung by a fine hook a brass wire *a d*, *a c*. These pass through two holes *m, m*, in the table; and to the wire *a d* is suspended a curious cylindrick wire *r s*, perforated at each end for that purpose. This wire *r s* is covered with paper graduated by equal divisions, and is about five inches long.

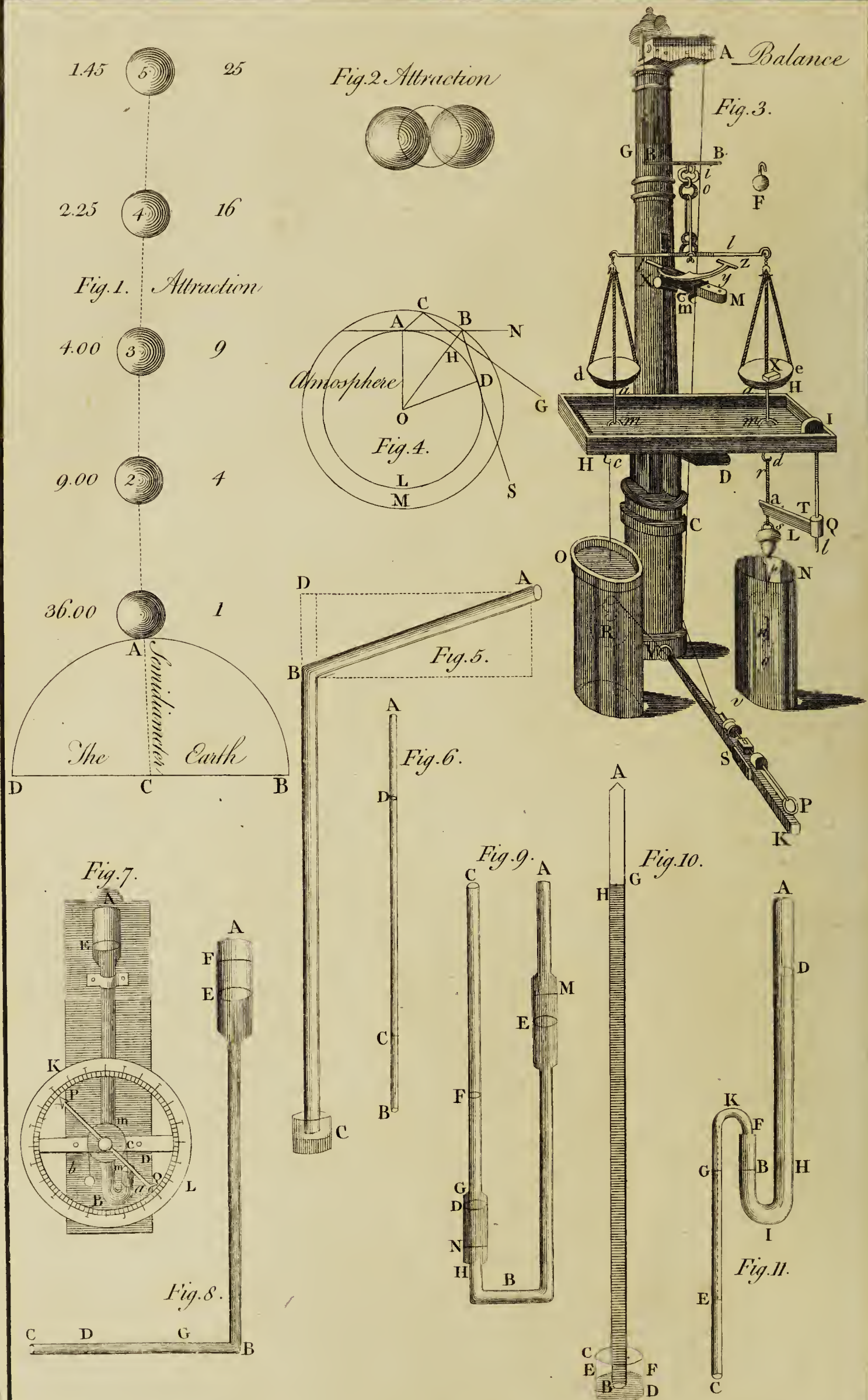
In the corner of the table near I, is fixed a brass tube, in which a round wire *l* is so adapted, as to move neither too hard nor too freely by its flat head I. Upon the lower part of this moves another tube

Q, which











Q, which has friction enough to cause it to remain in any position required; to this is fixed an index T, moving horizontally when the wire *l* is turned about, and therefore may be easily set to the graduated wire *r s*. To the lower end of the wire *r s* hangs a weight L, and to that a wire *p n* with a small brass ball *g* about one fourth of an inch in diameter. On the other side, to the wire *a c*, hangs a large glass bubble R to a horse-hair.

Let us at present suppose the weight L taken away, and the wire *p n* suspended from *s*; and on the other side, let the bubble R be taken away, and the weight F suspended in its room at *c*. This weight F we suppose to be such as will keep in æquilibrium with the several parts appended to the other scale, at the same time that the middle point of the wire *p n* is in the surface of the water in the vessel N. The wire *p n* is to be of such a size, that the length of one inch shall weigh four grains. Hence it is evident, since brass is eight times heavier than water, that for every inch the wire sinks in the water, it will become half a grain lighter, and half a grain heavier for every inch it rises out of the water: consequently by sinking two inches below the middle point, or rising two inches above it, the wire will become one grain lighter, or heavier.

So that, if when the middle point is at the surface of the water in æquilibrium, the index T be set to the middle point *a* of the graduated wire *r s*, and the distance on each side *a r* and *a s* contain 100 equal parts; then, when in weighing bodies the weight is desired to be the hundredth part of a grain, it may easily be had by proceeding in the following manner: Let the body to be weighed be placed in the scale *d* and put the weights in the scale *e*; and let these be so determined, that one grain more shall be too much, and one grain less too little. Then the balance being gently moved up or down by the screw P, till the equilibrium be nicely shewn at *o*; and then, if the index T be at the middle point *a* of the wire *r s*, it shews the weights put into the scale *e* are just equal to the weight of the body. But if the index T stand at any part between *a* and *r*, it shews the number of grains of the scale *e* were more than equal to the weight of the body in the scale *d*; because the wire *p n* now made lighter by sinking below the middle point.

Thus, suppose the weights put into the scale *e* were 1095 grains, and the index T cuts the 36 division above *a*, it shews that 36 hundredth parts of a grain are to be added, or that the weight of the body is 1095, 36 grains. On the other hand, had the index stood at 36, the division below *a*, it would have shewn the weights in the scale *e* were more than equal to the weight of the body by 36 hundredths of a grain, and that then the weight of the body was 1094, 64 grains. By this method we find the absolute weight of the body; the relative weight is found by weighing it hydrostatically in water, as follows: Instead of putting the body in the scale *d*, as before, let it be appended with the weight F at the hook *c*, by a horse-hair as at R, supposing the vessel of water O were taken away; then the equilibrium being made, the index T standing between *a* and *r*, at the 36th division shews, the weight of the body 1095, 36 grains.

As it thus hangs, let it be immersed in the water of the vessel O, and it will become lighter by much; the scale *e* will descend till the beam of the balance rests on the supporter *z*. Then suppose 100 grains, put into the scale *d*, restored the equilibrium precisely, so that the index T again pointed to the 36th division above *a*; it is plain the weight of an equal bulk of water would, in this case, be exactly 100 grains. But if 100 grains in scale *d*, cause it to preponderate a little, then, by turning the screw P, the balance may be raised, till the wire *p n* becoming heavier, restores the equilibrium. Let now the index T cut the 6th division above *a*; then  $36 - 6 = 30$ , which shews that the wire *p n* is now  $\frac{3}{10}$  of a grain heavier than before: therefore the weight of the water is only 99, 7 grains: whence its gravity to that of the body is as 99, 7 to 1095, 36 as required. After a like manner may this balance be applied to find the specifick gravities of fluids,

which will not be difficult to those who apprehend what has been already said.

Great precaution will be required when you come to practice, otherwise the results of this balance will not be accurate; the wire *p n* should be oiled, then wiped as clean as possible; for enough will still remain to prevent the water from adhering to it. The balance should also be raised very gently, and when it comes to an equilibrium, it should be tenderly agitated, to see if it will rest in equilibrium again.

**BALANCE of trade**, in commerce, the equality between the value of the commodities bought of foreigners, and the value of the native productions transported into other nations.

**BALANCE of a clock, or watch**. See the articles **CLOCK** and **WATCH**.

**BALANCE, Libra**, in astronomy. See the article **LIBRA**.

**BALANCING**, among seamen, is a singular method of contracting or reducing a sail in a tempest, very different from reefing, which is common to all the sails; whereas none are balanced but the mizzen and mainmasts set on booms. It is performed by rolling up a small space of it at the peak or upper corner, and fastening it to the yard.

**BALAUSTINE**, large rose-like flowers, of a deep red colour, set in long bell-shaped tough cups. They are the produce of the wild or double-flowered pomegranate tree, a low prickly tree or shrub, with long narrow leaves, bearing a brownish acerb fruit, about the size of an orange; a native of the southern parts of Europe.

**BALCONY**, in architecture, a projecture in the front of a house, or other building, supported by pillars, or consoles, and encompassed with a balustrade: or it is a kind of open gallery, for people to stand in, to behold any publick show, or for taking the air in.

**BALDACHIN**, or **BALDAQUIN**, in architecture, a building in form of a canopy, supported by pillars and frequently used as a covering to insulated altars. Some also use the term baldachin for the shell over a door.

**BALE**, in commerce, is said of merchandizes, packed up in cloth, and corded round very tight, in order to keep them from breaking, or preserve them from the weather.

**BALK**, among builders, is sometimes used for the summer-beam of a house; sometimes for the poles and rafters, which support the roofs of barns, &c. and sometimes for the beams used in making sea-holds.

**BALK**, in agriculture, signifies a ridge, or bank between two furrows.

**BALL**, in a general sense, a spherical and round body, whether it be so naturally, or turned into that figure by the hand of an artist: thus we say, a tennis-ball, foot-ball, cotton-ball, &c.

**BALL**, in the military art, comprehends all sorts of bullets for fire-arms, from the cannon to the pistol.

Cannon-balls are of iron; musquet-balls, pistol-balls, &c. are of lead. The experiment has been tried of iron balls for pistols and fuses, but they are justly rejected, not only on account of their lightness, which prevents them from flying strait, but because they are apt to furrow the barrel.

**BALL and socket** is an instrument made of brass, with a perpetual screw, so as to move horizontally, vertically, and obliquely: and is generally used for the managing of surveying, and astronomical instruments.

**BALL of a Pendulum**, the weight at the bottom. In shorter pendulums, this is called the bob. See **BOB**.

**BALL**, among printers, a kind of wooden tunnel stuffed with wool, contained in a leather cover, which is nailed to the wood, with which the ink is applied on the forms to be wrought off.

**Puff-BALL**, the English name of the lycoperdon.

**BALLAD**, or **BALLET**, a kind of song, adapted to the capacity of the lower class of people: who, being mightily taken with this species of poetry, are thereby not a little influenced in the conduct of their lives.

**BALLAST**, a quantity of stones, gravel, or sand, laid in a ship's hold, to make her sink to a certain depth into



into the water, and sail upright. The ballast is sometimes one quarter, one third, or one half, according to the difference of the bulk of the ship.

**BALLISTA**, in antiquity, a military machine used by the ancients in besieging cities, to throw large stones, javelins and darts. The word is Latin, signifying a cross-bow; and is derived from the Greek, *βαλλω*, to shoot, or throw.

From this engine, stones of a size not less than mill-stones, were thrown with so great violence, as to dash whole houses in pieces at a blow. It is described thus: a round iron cylinder was fastened between two planks, from which reached a hollow square beam, placed cross wise, and fastened with cords, to which were added screws; at one end of this stood the engineer, who put a wooden shaft with a big head into the cavity of the beam; this done, two men bent the engine by drawing some wheels: when the top of the head was drawn to the utmost end of the cords, the shaft was driven out of the *ballista*, &c.

**BALLISTES**, in ichthyology, the balance fish, common in the West-Indies.

**BALLOON**, or **BALLON**, denotes a large round short-necked matras, or vessel used in chymistry, to receive what is distilled or drawn off by means of fire.

**BALLOON** is also used in architecture, for a round ball or globe placed on the top of a pillar, or the like, by way of *acroter*, or crowning.

**BALLOTADE**, in the manege, the leap of a horse between two pillars, or upon a straight line, made with justness of time, with the aid of the hand, and the calves of the legs; and in such a manner, that when his fore feet are in the air, he shews nothing but the shoes of his hinder feet, without jerking out.

**BALLS**, or **BALLETS**, in heraldry, a frequent bearing in coats of arms, usually denominated according to their colours, bezants, plates, hurts, &c.

**BALLUSTER**, a small kind of pillar used for balustrades.

**BALLUSTRADE**, a series or row of ballusters, joined by a rail; serving as well for a rest to the elbows, as for a fence or inclosure to balconies, altars, stair-cases, fonts, &c.

**BALM**, or **BALSAM**. See **BALSAM**.

**BAM**, or **BAUM**, in botany. See **BAUM**.

**BALNEUM**, a term much used by chymists, to signify a vessel filled with some matter, as sand, water, or the like, in which others are placed for performing various operations that require less heat than a naked fire.

**BALNEUM Arenosum**, or *Sicum*, a sand, or dry heat; a vessel filled with sand, ashes, or filings of steel.

**BALNEUM Mariæ**, or *Maris*, a water bath, or a vessel filled with water, which is made to boil, and in which the vessels containing the ingredients are placed.

**BALNEUM Vaporis**, a vapour bath, or when the vessel containing the ingredients, on which the process is to be performed, is heated by the vapour arising from boiling water.

**BALSAM**, or **NATIVE BALSAM**, an oily, resinous, liquid substance, flowing either spontaneously, or by means of incision, from certain plants of sovereign virtue in the cure of several disorders. There are many kinds of balsams, but the most remarkable are these.

1. Balsam or balm of Gilead, called also balsamum Judaicum, Syaricum, e Meccha, and opobalsamum; being an exudation from the true balsamum Syriacum rutæ folio, so much esteemed in the country where it is produced, that it is accounted a rich present from the chief prince of Arabia Felix to the Grand Signior. In order to have it genuine, it should be chosen fluid as oil, of a very pale yellow colour, perfectly transparent, and of a fragrant smell, with something of the lemon or citron flavour, but not too much of it. In medicine, it opens obstructions of the lungs, and heals erosions from acrimony and the worst kind of ulcerations. It is prescribed in asthmas, pleurifies, and whatsoever requires expectoration; in inward bruises and sores, particularly those of the reins and urinary passages; and externally it is used to discharge and in-

carnate. For internal use, it may either be given in bolusses, or dropped on sugar, or finally dissolved into an emulsion by means of the yolk of an egg. The Turkish women use it as a cosmetic.

2. Balsam of Peru, which is distinguished into two sorts, the white and black. The former, by way of eminence called the balsam of incision, is a liquid of a white colour, resembling in external appearance the balm of Gilead, but easily distinguished from it by its smell. It is excellent for green wounds. The black balsam is obtained by boiling the wood of the tree which produces it. The best is of a darkish red colour, and of an admirable fragrant. It heals, dries, and discharges, and is much used externally, not only in wounds, but in palsies, ischiadick and rheumatick pains, and likewise by perfumers, on account of its excellent smell.

3. Balsam of Tolu, is produced from a tree, a species of the pine, which grows in New Spain. It is of a deep yellowish colour, approaching near to red, and of a most delicate scent, much beyond any other balsam. It first flows from the tree of the consistence of ordinary turpentine; but by keeping, we meet with it frequently so hard as to be brittle. Its virtues are the same in general with those of the Peruvian and Gilead kinds. It is given in consumptions and other disorders of the breast, sometimes in form of pills, sometimes of electuary; but as it has not the pungency of the other kinds, the best form of giving it is in emulsion dissolved in the yolk of an egg, and so mixed with water.

4. Balsam of Capivi, or of Copaiba, is the produce of one of the *arbores filiquosæ flore uniformi* of Mr. Ray. It is of a thinner consistence than the common turpentine, but much more fragrant and detergent. It passes away quickly by urine, and mightily cleanses those passages; for which reason it hath obtained very much in gonorrhœas, and all obstructions and ulcerations of those parts. The most agreeable way of taking it, is either in powdered sugar, or dropped into water.

5. Balsam of liquid amber may be justly reckoned among the simples of the balsamick kind. It drops from a tree of Mexico, called arbor styracifera, upon an incision being made into its bark. It is a resinous and pingous liquor, of a reddish yellow colour, of an acrid aromatick taste, and of the consistence of Venice turpentine. Its essence strengthens the head and nervous system, and its oil is of singular efficacy, both for external and internal uses.

Factitious or artificial balsams, are certain compositions chiefly of balsamick and healing ingredients, made by apothecaries in imitation of the native balsams. It would be almost endless to specify all the artificial balsams which have been contrived by dispensatory writers. Lemery, in his *Pharmacopée Universelle*, has seventy-three different sorts, besides many others in foreign dispensaries. The most remarkable of the London and Edinburgh dispensaries, are balsam of amber, of guaiacum, of lucatellus, of sulphur simple, or with Barbadoes tar, of turpentine, vulnerary, of many virtues, anodyne of Bates and Guido, apoplectic, magisterial, martiale and paralyticum.

**BALSAM**, with chymists, is a name given to the solutions and preparations of some salts, as balsam of saturn, tartar, falgem, &c.

Balsam of saturn is a solution of saccharum saturni, or sugar of lead, made with spirit of oil of turpentine, and digested till the matter hath gained a red tincture.

**BALSAM**, among alchymists, sometimes denotes the spirit of common salt, extracted by distillation, after placing a solution of the salt for a considerable time in horse-dung, in order to putrefy. This is said to preserve bodies the most liable to corruption.

**BALSAMICKS**, in pharmacy, softening, restoring, healing and cleansing medicines, of gentle attenuating principles.

These medicines, on account of their fine, subtile, and volatile oil, are not only grateful and agreeable to the constitution, but act upon the fluids, as well as the solids, of human bodies; diffusing their virtues through every part, and supplying the blood and humours



mours with a seasonable reinforcement of sulphurous, warm and aetherial parts, increasing their intestine motions, and conveying a genial vigour to the vital juices.

These medicines may be used with good success, both internally and externally, in all diseases of the head, nerves, spinal marrow, stomach and heart; such as palsies, apoplexies, numbness and torpor of the senses, weakness of the memory, difficulty of hearing, excessive weakness and faintings; they are also of singular service in most disorders of the stomach, and intestines, and are exquisitely adapted to the old and infirm. See **BALSAM**.

**BALSAMINA**, in botany, a genus of the syngenesia polygamia class of plants, the flower of which consists of four, five, or six petals, and its fruit is an unilocular capsule, consisting of five valves, and containing a number of roundish seeds affixed to a placenta. The most beautiful and valuable kind are those which produce flowers, of which there are three sorts, finely striped with pink, scarlet, or purple, so as to appear almost as beautiful as a carnation, and are much noticed by the curious.

**BALSAMITIA**, the name by which costmary, a species of tansy, is sometimes called; it is a corymbiferous plant, the roots of which are hard, fleshy, and creeping in the ground. In medicine, the leaves are chiefly used as a stomachick, cephalick, carminative, and deobstruent; they are also externally applied by way of fermentation, or bathing, in order to strengthen the joints, &c.

**BAMBOE**, or **BAMBOU**, a plant in the Indies, which multiplies very much by its root, from which springs a branchy tuft, after the manner of the European reeds. It is of the largest kind of cane, and decreases gradually to the top, where it bears a blossom, like our reeds. It grows in all the maritime countries of the East-Indies. Its leaves are like those of the other canes or reeds, but neither so long nor so broad at their base. With these bamboes the Indians build their houses, and make all sorts of furniture, in a very ingenious manner. The wood is so hard and strong, that they serve very well to make piles for supporting their little houses, built over rivers, or in plains overflowed at some seasons of the year with water. They also make with this wood all sorts of utensils for their kitchens and tables.

**BAN**, or **BANN**. See the article **BANN**.

**BAN**, in commerce, a sort of smooth, fine muslin, which the English import from the East-Indies. The piece is almost a yard broad, and runs about twenty yards and a half.

**BANANA-TREE**, in botany, a species of the mufa, or plantain, growing plentifully in the West and East-Indies. This plant rises with a soft herbaceous stalk, marked with dark purple stripes and spots, and grows fifteen feet high and upwards: the lower part of the stalk is often as large as a man's thigh, diminishing gradually to the top, where the leaves come out on every side: these are often six feet long, and above a foot wide. The fruit is six or seven inches long, and covered, when ripe, with a yellow and tender skin. It grows on a stalk which bears a bunch or cluster of bananas; when the bunch is gathered, they cut off the stalk, otherwise it would bear no more fruit. The pulp of the fruit is very soft, and of a pleasant taste, and is generally eaten in the hot countries by way of desert. It is said to be very nourishing, to provoke to venery, and excite urine.

**BAND**, in a general sense, some small, narrow ligament, wherewith any thing is bound, tied, or fastened; as a stay-band, a brow-band, a hat-band, &c.

**BAND**, in architecture, a general name for any flat, low member, or moulding, that is broad, but not very deep.

**BAND of Soldiers**, in military affairs, those who fight under the same flag or ensign.

**BAND of Pensioners**, are a company of one hundred and twenty gentlemen, who receive a yearly allowance of one hundred pounds for attending his majesty on solemn occasions.

**BAND**, is also the denomination of a military order in Spain, instituted by Alphonfus XI. king of Castile, for the younger sons of the nobility, who, before their admission, must serve ten years, at least, either in the army or at war; and are bound to take up arms in defence of the catholic faith against the infidels. The king himself is grand master of the order.

**BANDAGE**, in surgery, a fillet, roller, or swathe, used in dressing and binding up wounds, restraining dangerous hæmorrhages, and in joining fractured or dislocated bones.

Bandages should be made of strong linen cloth, that has been softened by wearing. They are of different forms, according to the uses they are designed for. Some are common, or applicable to any part; others are proper, or applicable only to particular parts. Some again are simple, or made up of one entire part; others compound, or composed of several pieces sewed together in different manners.

**BANDALEER**, or **BANDELEER**, in military affairs, a large leathern belt, thrown over the right shoulder, and hanging under the left arm; worn by the ancient musketeers, both for the sustaining of their fire-arms, and for the carriage of their musket charges, which being put up in little wooden cases, coated with leather, were hung, to the number of twelve, to each bandaleer.

**BANDALET**, or **BANDLET**, in architecture, any small band or flat moulding, as that which crowns the Dorick architrave.

**BANDITTI**, a term peculiarly denoting companies of highwaymen, common in Italy and France; but sometimes also used in a more general sense, for robbers, pirates, out-lawed persons, ruffians, &c.

**BANDORA**, the name of an ancient musical instrument, whose strings resemble those of the lute.

**BANIANS**, a religious sect in the empire of the Mogul, who believe a metempsychosis, and will therefore eat no living creature, nor even kill noxious animals; but endeavour to release them when in the hands of others.

**BANISHMENT**, a species of punishment, which obliges the guilty person to leave the realm.

**BANK**, in commerce, a common repository, where many persons agree to keep their money, to be always ready at their call or direction: or certain societies or communities, who take the charge of other people's money, either to improve it, or to keep it secure.

**BANK**, in natural history, denotes an elevation of the ground, or bottom of the sea, so as sometimes to surmount the surface of the water, or at least to leave the water so shallow, as usually not to allow a vessel to remain a-float over it.

**BANKER**, a person who banks, that is, trafficks and negotiates in money; who receives and remits money from place to place, by commission from correspondents, or by means of bills or letters of exchange.

**BANKER**, among bricklayers, implies a piece of timber, whereon they cut bricks.

**BANKING**, the making of banks to oppose the force of the sea, rivers or the like, and secure the land from being overflowed thereby.

**BANKRUPT**, any person, either man or woman, that by trading hath gotten other persons goods into his or her hands, and concealeth himself from his creditors. It is not buying or selling of lands, but of personal things, that will make a person liable to be a bankrupt: nor is it buying only, nor selling only, but both.

**BANN**, or **BAN**, *bannum*, or *bannus*, in the feudal law, a solemn proclamation or publication of any thing. Hence the custom of asking, or bans, before marriage. See the article **MARRIAGE**.

**BANN**, in military affairs, a proclamation made in the army by beat of drum, sound of trumpet, &c. requiring the strict observance of discipline, either for the declaring a new officer, or punishing an offender.

**BANN of the empire**, an imperial proscription, being a judicial punishment, wherewith such as are accessory to disturbing the publick peace, are judged unworthy



of the immunities and protection of the empire, and are out-lawed, or banished, &c.

BANNER, either a square flag, or the principal standard belonging to a prince.

BANNERET, an ancient order of knights, or feudal lords, who possessing several large fees, led their vassals to battle under their own flag, when summoned thereto by the king.

BANNIMUS, the form of expulsion of any member from the university of Oxford, by affixing the sentence up in some publick place, as a denunciation of it.

BANQUET, a feast or entertainment, where people regale themselves with pleasant foods, or fruits. It signifies also a bank, or raised way.

BANTAM-WORK, a kind of painted or carved work, resembling that of Japan, only more gaudy.

BAPTISM, in matters of religion, a sacrament, by which a person is initiated into the Christian church.

BAPTISMAL, something belonging to baptism; thus we say, baptismal vow, fonts, presents, &c.

BAPTISTS, in church-history, the name by which the Anabaptists usually distinguish themselves. See the article ANABAPTISTS.

BAPTISTERY, in ecclesiastical writers, the place where the ceremony of the baptism is performed.

BAR, in a general sense, implies a slender piece of wood or iron for keeping things close together.

BAR, in the courts of justice, signifies an inclosure made with strong pieces of timber, where the counsellors are placed to plead causes.

BAR, in law, denotes a plea of a defendant, which is sometimes sufficient to destroy the plaintiff's action.

BAR, in heraldry, is an ordinary resembling the legs, but much smaller.

BAR, in menage, implies the highest part of a horse's mouth, between the grinders and tusks, that part only which lies under, and at the side of the bars, retaining the name of gum.

BAR, in musick, is a perpendicular stroke drawn across the lines of a piece of musick, including between every two bars, a certain quantity, or measure of time, which is different, according as the measure is either triple or common. The principal use of bars is to regulate the beating of time, in a concert.

BAR, in hydrography, denotes a bank of sand, or other matter, whereby the mouth of a river is in a manner choaked up.

BAR-MASTER, among miners, the person who is entrusted with the dish or gage, for measuring the ores.

BARALIPTON, among logicians, the first indirect mode of the first figure of a syllogism. When the two first propositions are general, and the third particular, the middle term being the subject in the first proposition, and the predicate in the second, the syllogism is said to be in baralipon.

BARALOTTS, *Baralotti*, a sect of hereticks at Bologna in Italy, among whom all things, even their wives and children, were in common. They were also called *obedientes*, or compliers, because they readily complied with every thing that tended to promote debauchery.

BARANGI, officers among the Greeks of the lower empire, who were intrusted with the keys of the city gates, where the emperor resided. Codinus says, they were officers who kept guard at the door of the emperor's bed-chamber, or dining-room.

BARBACAN, or BARBICAN, properly signifies the outer wall, or exterior defence of a city or fortress.

BARBACAN also implies a fort at the entrance of a bridge, or in the out-let of a city, having a double wall with towers.

It likewise denotes an aperture made in the walls of a fortress to fire through upon the enemy.

BARBACAN, in architecture, is a canal or opening left in the wall, in order to give room for the water to run in and out, when buildings are erected in places liable to be overflowed, &c.

BARBADOES-TAR, *Petroleum Barbadosense*, in the materia medica, a fluid bitumen, or mineral oil, of a redish colour, and thick consistence, approaching to that of treacle, or common tar. It is found in several

of our American dominions, especially in that island from which it receives its name.

BARBARA, in logick, the first mode of the first figure of syllogisms.

A syllogism in barbara, is one whereof all the propositions are universal, and affirmative; the middle term being the subject of the first proposition, and attribute in the second; as,

BAR. Whoever suffers a man to starve, whom he ought to sustain, is a murderer:

BA. Whoever is rich, and refuses to give alms, suffers those to starve, whom he ought to sustain:

RA. Therefore whoever is rich, and refuses to give alms, is a murderer.

BARBARIAN, a name given by the ancient Greeks, to all those who were not of their own country, or did not speak the Greek language. In which sense the word signified with them, no more than foreigner, and did not carry that odium with it, as it does now.

BARBARISM, in grammar, an offence against the purity of style or language; or a hard and coarse expression, never used by polite authors.

BARBE, a name usually given to a Barbary horse, greatly esteemed for its beauty and swiftness.

BARBE, in the military art, is a term applied to the firing of cannon. Thus, to fire in barbe, is to fire the cannon over the parapet, instead of firing through the embrasures. The parapet must not be above three feet and a half high, otherwise it will be impossible to fire in this manner.

BARBE, among our ancestors, signified the armour of a knight's horse.

BARBELL, *barbus*, in ichthyology, a species of cyprinus, with the upper jaw longest, four cirri or beards, and seven bones in the pinna ani.

BARBERY, in botany. See BERBERIS.

BARBLES, or BARBS, in farriery, are small excrescences under the tongue, and which may be discovered by drawing it aside, and cured by cutting them close off, and washing the part with brandy, or salt and water.

BARCALAO, a species of cod resembling that of Newfoundland, caught in several parts of the South-sea, on the coast of the island of Juan-Fernandes in particular.

BARD, a poet among the ancient Gauls and Britons, who sung the praises of heroes, in order to recommend virtue, and sometimes to terminate a difference between two armies at the point of engagement.

BARDESANISTS, in church-history, Christian hereticks of the second century, who maintained that the devil was a self-existent independent being; that Jesus Christ was not born of a woman, but brought his body with him from heaven; and denied the resurrection of the body.

BARGE, in naval affairs, a boat of state and pleasure, adorned with various ornaments, having bales and tilts, and seats covered with cushions and carpets, and benches for many oars; as the lord-mayor's barge, a company's barge, an admiral's barge, &c. It is also the name of a flat-bottomed vessel employed for carrying goods in a navigable river; as those upon the river Thames, called *west-country barges*.

BARGE-couples, in architecture, a beam mortised into another, to strengthen the building.

BARGE-course, with bricklayers, a term used for that part of the tiling which projects over without the principal rafters, in all sorts of buildings, where there is either a gable or a kirkin-head.

BARILLIA, a kind of Spanish pot-ash, used in the glass trade.

BARING of trees, in agriculture, the taking away some of the earth about the roots, that the winter-rain and snow-water may penetrate further into the roots. This is frequently practised in the autumn.

BARK, *cortex*, in the anatomy of plants, the exterior part of trees, corresponding to the skin of an animal.

The ancients wrote their books on bark, especially of the ash and lime-tree, not on the exterior, but on the inner and finer bark, called philyra. The bark of the



the oak has been long used in tanning leather, and even thought essential to that operation; but a different substance has been lately discovered, which answers the purpose full as well, and may be procured at a much cheaper rate; we mean oak saw-dust, or the chips of oak reduced to powder. This valuable secret was lately purchased by the society for the encouragement of arts, &c. See the article **TANNING**.

*Jesuit's* **BARK**. See the article **QUINQUINA**.

**BARK**, in naval affairs, a general name given to small ships: also a ship of three masts, without any mizen-top mast: likewise a name to distinguish a vessel with a broad stern, without any figure on the prow or stem. See **STERN**.

**BARKING** of trees, the peeling off the rind or bark.

It is necessary, in our climate, to perform this operation in the month of May; because, at that season only, the bark is, by the great quantity of sap, separated from the wood.

**BARLEY**, **HORDEUM**, in botany.

The season for sowing barley differs according to the nature of the soil and situation of the place; some sowing in March, others in April, and some in May, yet with good success.

The principal use of barley is for making beer: but besides this, it is of considerable use in medicine, on account of its cooling and absterfive qualities. Hence, a decoction of barley, especially if a little nitre be dissolved in it, is greatly recommended in slow fevers. See the article **HORDEOLUM**.

**BARLEY-CORN**, the least of our long measures, being the third of an inch.

**BARNABITES**, in ecclesiastical history, a religious order, founded in the sixteenth century, by three Italian gentlemen, who had been advised by a famous preacher of those days to read carefully the epistles of St. Paul. Hence they were called clerks of St. Paul, and Barnabites, because they performed their first exercise in a church of St. Barnabas at Milan. Their habit is black, and their office is to instruct, catechise, and serve in mission.

**BARNICLE**, or soland goose, in natural history, a species of goose with a black beak, which is much shorter than that of the common goose. It is common in the north of Scotland.

**BARNICLE** also signifies a species of shell-fish, often found sticking to the bottoms of ships, rocks, &c.

**BARNICLES**, among farriers, an instrument composed of two branches, joined at one of the extremities with a hinge. It is put upon the nose of a horse, when he will not otherwise stand quiet to be shod, blooded, &c.

**BAROCO**, in logic, a term given to the fourth mode of the second figure of syllogisms. A syllogism in baroco has the first proposition universal and affirmative, but the second and third particular and negative, and the middle term is the predicate in the two first propositions. For example,

*Nullus homo non est bipes:*

*Non omne animal est bipes:*

*Non omne animal est homo.*

**BAROMETER**, a machine for measuring the weight of the atmosphere, and the variations therein, in order to determine the changes of the weather. The barometer is founded on an experiment of Torricelli, who considering that a column of water of about thirty-three feet was equal in weight to a column of air of the same base, concluded that a column of mercury, no longer than about twenty-nine inches and a half would be so too, such a column of mercury being as heavy as thirty-three feet of water. Accordingly he tried the experiment, and the apparatus he made use of is now the common barometer, or weather-glass. It is constructed in the following manner: *AB* (*plate VIII. fig. 10.*) a glass tube of thirty-four inches in length, and  $\frac{1}{4}$  of an inch in diameter, hermetically sealed at *A*, and open at *B*, is to be filled with quick-silver well defecated and purged of its air. The finger then being placed on the open end in immediate contact with the mer-

cury, so as to exclude every particle of air, the tube is inverted and carefully immersed, with the finger on the open end, into *CD* a basin of the same prepared mercury; then upon removing the finger, the mercury in the basin will join that in the tube, and the said column of mercury in the tube will be seen immediately to subside, as in the figure; *GH* represents the surface of the mercury in the tube, and *EF* that of the mercury in the basin.

This instrument is, perhaps, the best hitherto contrived for measuring the air's gravity, which that it may do to the greatest perfection, it is necessary that there be a nonius applied to the index of a graduated plate, to measure more accurately the rise and fall of the mercury. A nonius, so called from the name of its inventor, is a small plate so contrived as to slide by a graduated plate in such a manner, that its index may be always set on one part to the surface of the mercury, and on the other end pointing to the division in the scale of inches corresponding thereto. It is divided into ten equal parts, which together are equal to eleven of the divisions of the scale, that is eleven tenths of an inch; and consequently each small division of the nonius is equal to 1.1, two of them to 2.2, three of them to 3.3 of an inch, and so on. Whence it is easy to observe, that if the index points between any two divisions of the scale, we need only look back to see what division of the nonius coincides with a division of the scale, and that will shew the number of tenths of a tenth; which is a great degree of exactness.

The mercury standing at a less height, the nearer it is carried to the top of the atmosphere, renders the barometer useful in determining the height of mountains, and finding out the different elevation of one place above another. Accordingly Dr. Halley, in the philosophical transactions, shews how many feet each inch in the descent of the mercury answers to, as it is conveyed to any elevated place. See **ATMOSPHERE**.

But the principal use of it is to estimate the gravity of the air at different times, in order to foresee the alterations of the weather; for which purpose the following most remarkable phenomena, relating to the rising and falling of the mercury, are said to be carefully observed. 1. The rising of mercury presages in general fair weather, and its falling foul weather. 2. In very hot weather, the falling of mercury fore-shews thunder. 3. In winter, the rising presages frost, but in a continued frost, it presages snow. 4. When foul weather happens soon after the falling of the mercury, expect but little of it, and so on the contrary of fair weather. 5. But when the mercury continues to rise for some time before the foul weather is over, expect a continuance of fair weather to follow. 6. In fair weather, when the mercury continues to fall before rain comes, then expect a great deal of wet, and probably high winds. 7. The unsettled motion of the mercury denotes uncertain and changeable weather.

From these observations it appears, that it is not so much the height of the mercury in the tube that indicates the weather, as the motion of it up and down, wherefore, in order to know whether the mercury is rising or falling, the following rules are of use.

1. If the surface of the mercury is convex, it is a sign that the mercury is then rising. 2. If the surface is concave it is sinking. 3. If the surface is plain, or rather a little convex, the mercury is stationary. 4. If the glass is small shake the tube, and if the air is grown heavier, the mercury will rise about half the tenth of an inch; if it is growing lighter, it will sink as much.

The usefulness of barometers, and the advantage that would arise from perceiving the most minute variations in estimating the height of places, have given occasion to the invention of several kinds of barometers, different from the torricellian or common one, though founded on the same principle. In all these, the artist's principal view has been to enlarge the scale of variation, which in the common one, is not above three inches.

The horizontal or rectangular barometer (*fig. 8.*) is hermetically



hermetically sealed with mercury from D to E; then as the upper surface of it rises in the tube, suppose from E to F, the lower will be driven from D to G, as many times further as this part of the tube is less than at E. But it often happens, that some parts of the mercury break off from the rest in the leg BC, and are left behind.

The diagonal barometer is represented by ABC, (fig. 5.) wherein the mercury, instead of rising from B to D (suppose that space to correspond to the scale of variation in a strait tube) will rise from B to A, for it will always stand at the same perpendicular height, whatever be the inclination of the tube, because fluids press only according to their perpendicular altitude. But the tube AB must not be too much inclined, lest the mercury break in it, as in the former.

The wheel-barometer will be understood from (fig. 7.) where ABD is a tube filled with mercury from a to E, a being an iron ball swimming on the surface of the mercury; this, as it subsides on the surface of the mercury, draws round the little wheel *mm*, to the circumference of which it is fixed by means of the string *ac*. This wheel carries the index PQ, which points to the graduated edge of the circle KL, and by its motion, shews the most minute variations of the mercury. When the ball *a* is raised by the mercury on which it swims, the index is drawn on the contrary way by a lesser ball *b*, which hangs on the other side of the wheel. The friction in this machine, unless it be made with great accuracy indeed, renders it useless.

The pendent barometer consists of a small conical tube (fig. 6.) hermetically sealed at A, and filled with mercury from C to D, and empty from thence to A. Now supposing the gravity of the air increased, it will raise the mercury higher in the tube, and so force it into a narrower part; by which means the column becoming longer, its perpendicular pressure upon the air below will be proportionably increased. On the contrary, when the air becomes lighter, the mercury descends into a larger part of the tube, and by that means has the length of its column proportionably contracted. But in this barometer either the tube must be very small, in which case the friction of the mercury against the sides will hinder it from rising and falling freely; or when the tube is large, the air will get in, and be apt to divide the column in several places.

These are the principal contrivances hitherto invented for enlarging the scale of variation in simple mercurial barometers. There are other inventions of compound barometers, viz. such as are made of mercury and water, or other liquors, as the marine barometer and statical barometer; but they are so difficult to make, so faulty when made, and so troublesome to use, that we shall not describe them. However, that the reader may have an idea of two of the best sort, we shall present him with a description of that of Des Cartes, and of that which owes its invention to Mr. Rowning.

That of Des Cartes is a bent tube ABC, (fig. 9.) hermetically sealed at A, filled with water from F to D, from D to E with mercury, and empty from thence to the top. Then, upon the mercury's rising, suppose from E to M, and falling as much at D, the surface of the water at F would sink so many times further than the surface of the mercury at D as the tube CG was smaller than GH. But the water here is liable to evaporate.

ABC (fig. 11.) represents Mr. Rowning's, and is a compound tube sealed at A, and open at C, empty from A to D, filled with mercury, from thence to B, and from thence to E with water. Let GBH be an horizontal line, then it is plain, from the nature of the syphon, that all the compound fluid contained in the part from H to G, must ever be in æquilibrium with itself, be the weight of the air what it will, because the pressure at H and G must be equal. Whence it is evident, that the column of mercury DH is in æquilibrium with the column of water GE, and a column of air of the same base conjointly, and will therefore vary with the sum of the variations of each of these. The great property of this barometer is, that the scale of variation may be increased *ad infinitum*.

**BARON**, a degree of nobility, between a viscount and a baron.

It is probable that formerly all those were barons, who had lordships with courts-baron, and soon after the conquest all such sat in the house of peers; but they being very numerous, it grew an order and custom, that none should sit but such as the king thought fit to call up by writ, which ran *pro hac vice tantum*. This state of nobility being very precarious, they at length obtained of the king letters patent, and these were called barons by patent, or creation, the only way now in use of making barons, unless when the son of a lord, in his ancestor's life-time is summoned by writ.

On solemn occasions, barons wear a coronet.

**BARON by tenure**, one who held certain territories of the king, who still retained the tenure in chief to himself.

**BARONS of the Exchequer**, the four judges to whom the administration of justice is committed, in causes between the king and his subjects, relating to matters concerning the revenue. They were formerly barons of the realm, but of late are generally persons learned in the laws. Their office is also to look into the accounts of the king, for which reason they have auditors under them.

**BARONS of the Cinque-ports**, are members of the house of commons, elected by the five ports, two for each port.

**BARON AND FEME**, in our law, a term used for the husband in relation to his wife, who is called feme; and they are deemed but one person, so that a wife cannot be witness for or against her husband, nor he for or against his wife, except in cases of high-treason.

**BARON AND FEME**, in heraldry, is when the coats of arms of a man and his wife are borne per pale in the same escutcheon, the man's being always on the dexter side, and the woman's on the sinister; but here the woman is supposed not an heiress, for then her coat must be borne by the husband on an escutcheon of pretence.

**BARONET**, a modern degree of honour, next to a baron, created by king James I. in order to propagate a plantation in Ulster, in Ireland, for which purpose each of them was to maintain thirty foldiers in Ireland, for three years, after the rate of eight-pence sterling per day to each foldier. The honour is hereditary, and they have the precedence of all knights, except those of the garter, bannerets, and privy-counsellors. They are stiled baronets in all writs, and the addition of Sir is attributed to them, as the title of Lady is to their wives. No honour is to be created between barons and baronets.

**BARONY**, the honour and territory which gives title to a baron, whether he be a layman or a bishop.

**BAROSCOPE**, the same with barometer. See the article **BAROMETER**.

**BARRA**, in commerce, a long-measure used in Spain and Portugal, to measure woollen and linen cloths. This measure is of three sorts, the barra of Valencia, 13 of which make  $12\frac{6}{7}$  yards English: the barra of Castile, 7 of which make  $6\frac{3}{4}$  yards; and the barra of Arragon, three of which make  $2\frac{4}{7}$  yards English.

**BARRACAN**, in commerce, a sort of stuff, not diapered, something like camblet, but of a coarser grain. It is used to make cloaks, furtouts, and such other garments, to keep off the rain.

**BARRACKS**, or **BARACKS**, places for soldiers to lodge in, especially in garrisons.

**BARRATOR**, in law, a common mover or maintainer of suits and quarrels, either in courts or elsewhere in the country. A man cannot be adjudged a barrator for bringing any number of suits in his own right, though they are vexatious. Barrators are punished by fine and imprisonment.

**BARRATRY**, in law, signifies the fomenting quarrels and law-suits.

**BARRATRY**, in a ship-master, is his cheating the owners. If goods delivered on ship-board, are em-



bezzled. all the mariners ought to contribute to the satisfaction of the party that lost his goods, by the maritime law; and the cause is to be tried in the admiralty.

**BARREL**, in commerce, a round vessel, extending more in length than in breadth, made of wood, in form of a little tun, and serves for holding several sorts of merchandize. It is also a measure of liquids. The English barrel, wine-measure, contains the eighth part of a tun, the fourth part of a pipe, and one half of a hoghead; that is to say, it contains thirty-one gallons and a half: A barrel, beer-measure, contains thirty-six gallons; and, ale-measure, thirty-two gallons. Barrel also denotes a certain weight of several merchandizes, which differs according to the several commodities: A barrel of Essex butter weighs one hundred and six pounds; and of Suffolk butter, two hundred and fifty-six pounds. The barrel of soap must weigh 256 lb. The barrel of herrings ought to contain thirty-two gallons wine measure, which amount to about twenty-eight gallons old standard, containing about a thousand herrings. The barrel of salmon must contain forty two gallons. The barrel of eels the same.

**BARREL**, in mechanicks, a term given by watch-makers to the cylinder about which the spring is wrapped: And by gun-smiths to the cylindrical tube of a gun, pistol, &c. through which the ball is discharged.

**BARREL**, in anatomy, a pretty large cavity behind the tympanum of the ear, about four or five lines deep, and five or six wide.

**Thundering BARREL**, in military affairs, a cask filled with various kinds of combustibles, bombs, grenades, and other fire-works to be rolled down a breach.

**BARRENNESS**. See the article **STERILITY**.

**BARRICADE**, *Barricada*, in military affairs, a kind of fence formed in some critical exigence, with empty barrels filled with earth, or some other heavy commodity, felled trees, carts, &c. to preserve the soldiers from the enemy's shot or assault.

**BARRICADE**, in naval architecture, a strong wooden rail, supported by stanchions, extending across the foremost part of the quarter-deck.

**BARRIER**, in fortification, a kind of fence composed of stakes, and transoms as overthwart rafters erected to defend the entrance of a passage, retrenchment, or the like. In the middle of the barrier is a moveable bar of wood which is opened and shut at pleasure. A barrier is commonly set up in a void space, between the citadel and the town, in half moons, &c.

**BARRING a Vein**, among farriers, implies, on operation performed on the veins of a horse, in order to lessen the quantity of malignant humours that prevail there.

**BARRISTER**, a person qualified and impowered to defend the cause of clients in the courts of justice. Barristers are distinguished by the epithets outer and inner. The outer-barristers are those who plead without the bar. The inner-barristers are those who are allowed the privilege of pleading within the bar. But at the Rolls, and some other inferior courts, all barristers are admitted within the bar.

**BARROW**, is any kind of carriage moved by the hand as a hand-barrow.

**BARROW**, in some salt works, is a name given to wicker cases in the form of a sugar loaf, wherein the salt is put to drain.

**BARRULET**, in heraldry, the fourth part of the bar, or the one half of the cloiset: An usual bearing in coat-armour.

**BARRULY**, in heraldry, is when the field is divided bar-ways, that is across from side to side, into several parts.

**BARRY**, in heraldry, is when the escutcheon is divided bar-ways, that is, across, from side to side, into an even number of partitions, consisting of two or more tinctures, interchangeably disposed: It is to be expressed in the blazon by the word *barry*, and the number of pieces must be specified; but if the divisions be odd, the field must be first named, and the number of bars expressed.

**BARRY-BENDY** is when an escutcheon is divided evenly, bar and bend-ways, by lines drawn transverse and diagonal, interchangeably varying the tinctures of which it consists.

**BARRY-PILY** is when a coat is divided by several lines drawn obliquely from side to side, where they form acute angles.

**BARTER**, or **TRUCK**, is the exchanging of one commodity for another; in doing of which the price of one of the commodities, and an equivalent quantity of the other, must be found either by practice, or by the rule of three.

**BARTERING**, in commerce, the art of trucking or exchanging one commodity for another.

The word is formed from the Spanish, *baratar*, to deceive, or circumvent; because, perhaps, those who deal this way, endeavour to over-reach one another.

**BARTHOLOMITES**, a religious order founded at Genoa, in the year 1307; but the monks leading very irregular lives, the order was suppressed by pope Innocent X. in 1650, and their effects confiscated.

**BARUCH**, the name of an apocryphal book, subjoined to the canon of the Old Testament.

It has been reckoned part of Jeremiah's prophecy, and is often cited by the ancient fathers as such. Josephus tells us, that Baruch was descended from a noble family. It is added, that he wrote the book himself, while he continued at Babylon; but at what time is uncertain.

**BAS-RELIEF**. See **BASSO-RELIEVO**.

**BASALTES**, in natural history, called also *coticula lapis heraclius*, and *lapis lydius*, a kind of marble, of a very fine texture, of a deep glossy black, resembling that of polished steel, and mixed with no other colour, nor any extraneous matter. The most remarkable quality of this marble is its figure, being never found in strata like other marbles, but always standing up in the form of regular angular columns, composed of a number of joints, one placed on, and nicely fitted to another, as if formed by the hands of a skilful workman. The giants causeway in Ireland is entirely composed of the basaltes; and is, perhaps, the most surprising natural production of this kind in the world.

**BASARUCO**, in commerce, a small base coin in the East-Indies, being made only of very bad tin. There are, however, two sorts of this kind, a good and a bad, which is one sixth in value lower than the good.

**BASE**, in geometry, the lowest side of the perimeter of a figure: thus any side of a triangle may be called its base; but the lowest, or that parallel to the horizon, is most properly the base to the horizon. In rectangled triangles, the base is properly that side opposite to the right angle.

**BASE of a solid Figure**, the lowest side, or that on which it stands.

**BASE of a Conic Section**, a right line in the hyperbola and parabola, arising from the common intersection of the secant plane, and the base of the cone.

**BASE**, in architecture, is used for any body which bears another, but particularly for the lower part of a column and pedestal.

**BASE**, in fortification, the exterior side of the polygon, or that imaginary line which is drawn from the flanked angle of a bastion, to the angle opposite to it.

**BASE**, in gunnery, the least sort of ordnance, the diameter of whose bore is one inch and a quarter, its length four feet, its weight 200 pounds, its charge of powder 5 pounds, and the shot it carries one pound and a half, and diameter one inch and an eighth.

**BASE-LINE**, in perspective, the common section of a picture, made by the perspective and geometrical planes.

**BASE of the Heart**, in anatomy, denotes its upper part. See **HEART**.

**BASE Estate**, in law, implies the estate held by a base tenure.

**BASE Tenure**, the holding by villenage, or other customary services.

**BASE Fee**, is to hold in fee at the will of the lord.

**BASE Court**, any court not of record.



**BASEMENT**, in architecture, a base continued to a considerable length, as round a house, room, &c.

**BASHAW**, properly signifies a Turkish governor of a province, district or city: but is an appellation given by way of courtesy to almost every person of figure at the Grand Seignior's court.

**BASIL**, among joiners the sloping edge of a chisel, or the iron of a plane. They usually make the basil 12 degrees, and for hard wood 18, it being known that the more acute the basil is, the better the instrument cuts; and more obtuse the stronger and fitter it is for service.

*Order of St. BASIL*, the most ancient of all the religious orders, was very famous in the east. It passed into the west about the year 1057, and was held in great esteem, especially in Italy. As to their rules, the Italian monks of that order fast every Friday in the year: They eat meat but three times a week, and then but once a day: They work all together at certain hours of the day: Their habit is nearly like that of the Benedictines, and they wear a small beard like the fathers of the mission.

**BASILICK**, in ancient architecture, a term used for a large hall, or publick place, with isles, porticos, galleries, tribunals, &c. where princes sat and administered justice in person.

**BASILICA**, in anatomy, implies the interior branch of the axillary vein, extending the whole length of the arm.

**BASILICON**, in pharmacy, an epithet applied to a great number of medicines found in ancient medicinal writers.

**BASILICKS**, a body of the Roman laws, comprehending the institutes, digests, codes, novels, and some made by Justinian and other emperors.

**BASILICVS**, in astronomy, *cor leonis*, a fixed star of the first magnitude in the constellation of Leo.

**BASILIDIANS**, in church-history, a branch of gnosticks, who maintained that Christ's body was only a phantom, and that Simon the Cyrenian suffered in his stead.

**BASILISK**, in military affairs, a large piece of ordnance, being a 48-pounder, and weighing about 7200 pounds. Those of the French were 10 feet long, and those of the Dutch 15. The French do not cast any more of that calibre.

**BASIOGLOSSUS**, in anatomy, a muscle arising from the base of the *os hyoides*.

**BASIS**, *base*, in geometry. See **BASE**.

**BASKET**, a machine composed of twigs interwoven together, in order to hold fruit, earth, &c. It denotes a certain quantity of some commodities, as a basket of medlars is two bushels: a basket of *asa-fœtida* is from 15 to 20 lb. weight.

**BASKETS of Earth**, in military affairs, are simple baskets used in sieges. They are filled with earth, and placed upon the parapet of the trench. They are about a foot and a half in diameter at the top, and eight inches at the bottom, and a foot and a half in height.

**BASKET-FISH**, a kind of star-fish caught in the seas of north America.

**BASKET-SALT**, that made from salt-springs being purer, whiter, and composed of finer grains than the common brine-salt.

**BASKET-TENURE**, a tenure of lands by the service of making the king's baskets.

**BASON**, *Pelvis*, in anatomy, see the article **PELVIS**.

**BASON**, in hydraulicks, a reservoir of water, used for various purposes: thus we say, the bason of a jet d'eau, the bason of a fountain, and likewise the bason of a port or harbour.

**BASON**, in Jewish antiquities, the laver of the tabernacle, made of the brass looking-glasses belonging to those devout women that watched and stood centinels at the door of the tabernacle.

**BASON**, in mechanicks, a term used by glass-grinders for a dish of copper, iron, &c. in which they grind convex glasses, as concave one's are formed on spheres: and by hatters for a round iron mould, in which they form the matter of their hats, and also for a leaden one

for the brims of hats, having an aperture in the middle, a diameter sufficient for the largest block to go through.

*Sale by the BASON*, at Amsterdam, is a publick sale made by authority, over which presides an officer, appointed by the magistrates. It is so called because, before the lots are delivered to the highest bidder, they commonly strike on a copper bason, to give notice that the lot is going to be adjudged.

**BASONS of a Balance**, the two scales or dishes fastened to the extremities of the strings, the one to hold the weight, and the other the thing to be weighed.

**BASON of a Dock**, the place where the water is confined by gates, and prevented from running out at the time of ebb.

**BASON** also implies some part of a harbour which opens through a narrow channel, into a wide and spacious reservoir for shipping.

**BASS**, in musick, that part of a concert which is most heard, which consists of the gravest and deepest sounds, and which is played on the largest pipes or strings of a common instrument, as of an organ, lute, &c. or on instruments larger than ordinary, for that purpose, as bass-voils, bassoons, bass-hautboys, &c.

*Thorough-BASS*, is the harmony made by the bass-voils, or theorbos, continuing to play both while the voices sing, and the other instruments perform their parts, and also filling up the intervals, when any of the other parts stop.

**BASSOON**, a musical instrument of the wind kind, blown with a reed, furnished with eleven holes, and used as a bass in a concert of hautboys, flutes, &c.

**BASSO-RELIEVO**, a piece of sculpture where the figures do not protuberate, jut, or stand out far above the place on which they are formed.

**BASS-VIOL**, a musical instrument of the stringed kind, resembling a violin, but much larger.

**BASTARD**, a natural child, or one born of an unmarried woman. By the laws of England, a bastard is incapable of inheriting land, as heir to his father: nor can any one inherit land as heir to him, except the children of his own body; for by order of law, a bastard has no relation, of which it takes any notice, and he himself is accounted the first of his family.

**BASTARD** is also used diminutively, to denote the imperfection or less value of things.

**BASTERNA**, a sort of vehicle, drawn by beasts, much the same with our chariot, used by the ancient Roman ladies.

**BASTION**, in the modern fortification, a huge mass of earth, faced usually with sods, sometimes with brick, and rarely with stone, standing out from a rampart, whereof it is a principal part, and is what, in the ancient fortification, was called a bulwark. A bastion consists of two faces and two flanks; the faces include the angle of the bastion, and their union makes the outmost, or the salient angle, called also the angle of the bastion; and the union of the two faces to the two flanks make the side angles, called also the shoulders, or epaules; and the union of the two other ends of the flanks to the two curtains makes the angles of the flanks.

*Flat BASTION*, is a bastion built in the middle of the curtain, when it is too long to be defended by the bastion at its extremes.

*Solid BASTIONS* are those that have the void space within them filled up entirely, and raised of an equal height with the rampart.

*Void and hollow BASTIONS*, are those that are only surrounded with a rampart and parapet, having the space within void and empty, where the ground is so low, that if the rampart be taken, no retrenchment can be made in the centre, but what will lie under the fire of the besiegers.

*Cut BASTION*, is that whose point is cut off, and instead thereof has a re-entering angle, or an angle inwards with two points outwards, and is used, either when without such a contrivance the angle would be too acute, or when water or some other impediment hinders the carrying on the bastion to its full extent.

*Composed*



*Composed* BASTION is when two sides of the interior polygon are very unequal, which makes the gorges also unequal.

*Ennerv'd* BASTION, is when the irregularity of the lines and angles makes the bastion out of shape, as when it wants one of its demigorges, one side of the interior polygon being too short.

*Regular* BASTION, is that which has its due proportion of faces, flanks, and gorges.

*Demi* BASTION, is composed of one face only, and but one flank, and a demigorge.

*Double* BASTION, is that which is raised on the plane of another bastion.

BASTON, one of the servants to the warden of the Fleet prison. He attends the king's courts with a red staff, for taking into custody such persons as are committed by the court. He also attends upon such persons as are permitted by licence to go out at large.

BAT, in natural history, a kind of amphibious animal, partaking both of the mouse and the bird, and flying, though destitute of feathers.

BATABLE *Ground*, the lands lying between England and Scotland, when these two countries were distinct kingdoms, and to which both natives pretended a right.

BATCHELOR, a person still continuing in a state of celibacy, or who was never married.

BATCHELORS, in an university-sense, are persons that have attained to the baccalaureate, or who have taken the first degree in the liberal arts and sciences.

BAT-FOWLING, a method of catching birds in the night, by lighting some straw, or torches, near the place where they are at roost; for upon beating them up, they fly to the flame, where being amazed, they are easily caught in nets, or beat down with bushes fixed to the end of poles, &c.

BATH, a sufficient quantity of water collected in some convenient receptacle, for people to wash in, either for health or pleasure.

Baths are distinguished into natural and artificial, and natural again into hot and cold. The chief hot baths in our country are those at Bath, near Wells, in Somersetshire; and those at Buxton and Matlock in Derbyshire.

In the city of Bath are four hot baths: one triangular, called the cross bath, the heat of which is more gentle than that of the rest, because it has fewer springs in it; the second is the hot bath, which was formerly much hotter than the rest, but it was then not so large as at present: the other two are the King's and Queen's Bath, divided only by a wall; the last having no spring, but receives its water from the King's Bath: each of these is furnished with a pump, to throw out the water upon the diseased, where that is required.

These waters abound with a mineral sulphur; they are hot, of a bluish colour, and strong scent; they do not pass through the body like most other mineral waters; though if salt be added, they purge presently. On settlements, they afford a black mud, which is used by way of cataplasm in aches, and proves of more service to some than the waters themselves: the like they deposit on distillation, and no other: the cross-bath preys on silver, all of them on iron, but none on brass.

The use of these baths is found beneficial in disorders of the head, as palsies, &c. in cuticular diseases, as leprosy, &c. obstructions, and constipations of the bowels, the scurvy and stone, and in most diseases of women and children; they are used as a last remedy in obstinate chronick diseases, where they succeed well, if they agree with the constitution of the patient.

Of the three hot European waters of note, *viz.* Aix-la-Chapelle, Bourbon, and Bath, the first abounds more eminently in sulphur, which makes its heat, nauseousness, and purgative faculty so great, that few stomachs can bear it.

The Bourbon are of a middle nature, between the Aix-la-Chapelle and the Bath waters; being less hot, nauseous, and purgative than those of Aix-la-Chapelle; but more so than the Bath waters.

Cold baths were by the ancients held in the greatest esteem; and though they were long banished out of medicine, the present age can boast of abundance of

noble cures performed by them, and such as were long attempted in vain by the most powerful medicines.

The cold bath is serviceable in most chronick disorders; it always acts the part of a diuretick; and will do more, especially plunging over head in sea-water, in the cure of melancholy, madness, and particularly that occasioned by the bite of a mad dog, than any other medicine.

Artificial baths are various, according to the various occasions; as aqueous baths, vaporous baths, dry baths, &c. Aqueous baths are made from common plants, and other emollient, resolvent, and nervine substances; consisting sometimes of milk and emollient herbs, with rose-water, &c. when the design is to humectate, or when it is only to cleanse, it consists of bran and water alone; and when it is for an excessive pain or tumour, &c. in these cases it consists of a decoction of roots, plants, and some spirit of wine.

In vapour baths, the design of which is to promote a perspiration, the steam or fume of some decoction is received upon some part of the body for that purpose. In these baths there is no part of the patient's body plunged into the decoction, only those parts which require it are properly disposed to receive the steams of some proper fomentation. Of this kind are the bagnios, where persons are made to sweat by the heat of a room, and pouring on of hot water.

Vapour baths are of singular service in cold distempers, anasarca, oedematous tumours, paralytick cases, swellings of the testicles, &c.

Dry baths are made of ashes, salt, sand, shreds of leather, &c. This bath is successful in provoking sweat in a plentiful manner, the patient being placed conveniently for the reception of the fumes: they are found useful in removing old obstinate pains, and are very effectual in venereal complaints.

BATH, in Hebrew antiquity, a measure of capacity, containing the tenth part of an omer, or seven gallons and four pints, as a measure for things liquid; or three pecks and three pints, as a measure for things dry.

BATHS, in architecture, superb buildings, erected for the sake of bathing.

Those buildings, among the ancients, were most pompous and magnificent; such were those of Titus, Paulus Æmilius, and Dioclesian, whose ruins are still remaining.

*Knights of the BATH*, a military order in England, supposed to have been instituted by Richard II. who limited their number to four: however, his successor, Henry IV. increased them to forty-six. Their motto was *tres in uno*, signifying the three theological virtues.

This order received this denomination from a custom of bathing, before they received the golden spur. It is seldom ever conferred but at the coronation of kings, or the inauguration of a prince of Wales, or duke of York. They wear a red ribbon beltwise.

The order of the bath, after remaining many years extinct, was revived under George I. by a solemn creation of a great number of knights.

BATH-kol, the daughter of a voice. So the Jews call one of their oracles, which is frequently mentioned in their books, especially the Talmud, being a fantastical way of divination invented by the Jews themselves, not unlike the *sortes virgilianæ* of the heathens. However, the Jewish writers call this a revelation from God's will, which he made to his chosen people, after all verbal prophecies had ceased in Israel.

BATH-METAL, a composition of copper and zink melted together.

BATMAN, in commerce, a kind of weight used at Smyrna, containing six okes, of four hundred drachms each, which amount to sixteen pounds, six ounces, and fifteen drachms, English weight.

BATON, or BASTON. See BASTON.

BATRACHOMYOMACHIA, battle of the frogs and mice, the title of an elegant burlesque poem, commonly ascribed to Homer.

The word is compounded of the Greek, βατραχον, a frog, μυς, a mouse, and μάχη, a battle.

The cause of this battle is the death of Pŷcharpax, a mouse, son to Taxartes, who being mounted on the back



baek of Phylignathus, a frog, on a voyage to her palace, to which she had invited him, was seized with fear, on seeing himself in the middle of a pond, so that he tumbled off and was drowned. The mice suspecting that Phylignathus had shaken him off with design, demanded satisfaction, and, by unanimous consent, declared war against the frogs.

**BATTALIA**, in military affairs, implies an army or considerable detachment of troops drawn up in order of battle, or in a form proper to attack the enemy.

**BATTALION**, a body of infantry, undetermined with regard to number, but generally from five to eight hundred, drawn up in order of battle, and ready to engage.

**BATTEN**, a name that workmen give to a scantling of wooden stuff, from two to four inches broad, and about one inch thick; the length is pretty considerable, but undetermined.

**BATTERING**, the attacking a place, work, or the like, with heavy artillery.

**BATTERING Pieces**, large pieces of cannon, used in battering a fortified town or post.

**BATTERING Ram**. See the article **RAM**.

**BATTERY**, in the military art, a parapet thrown up, or formed of fascines, &c. for covering the gunners, &c. from the shot of the enemy.

All field batteries consist of four chief parts, namely, the ditch, the parapet, the platform, and the magazine.

The ditch is usually dug in the front and sides, and sometimes quite round; and serves not only to furnish the earth necessary for the parapet, but it also prevents the enemy from entering the battery so readily as he might otherwise do. The ditch in front is commonly eighteen or twenty feet broad, and the depth about seven or eight feet; the sides sloping towards the bottom, which is about six feet wide: but the ditches on the sides are about ten feet wide, and six feet deep. These are the dimensions usually given; but the general practice seems to be, only to get earth sufficient for the work, and not mind the regularity of the ditch; for as these works in attacks are usually done by night, the keeping strictly to the assigned dimensions is hardly practicable.

**BATTERY d'Enfilade**, is that which scours or sweeps the whole length of a straight line.

**BATTERY en Echarpe**, is one that plays obliquely.

**BATTERY de Reverse**, that which plays on the back of the enemy.

**BATTERY à Ricochet**, is when the cannon are not loaded with their full charge of powder, so that the balls may strike the ground before they reach the place, and by rising again leap over the wall and do execution among the besieged.

**Cross BATTERIES**, are two batteries which play athwart one another, upon the same object, forming an angle, and beating with more violence and destruction; because what one bullet shakes the other beats down.

**Camerade BATTERY**, is when several guns play at the same time upon one place.

**Sunk, or Buried BATTERY**, is when the platform on which the guns are placed is sunk into the earth, so that there must be trenches or embrasures cut in the earth, against the muzzles of the guns, for passages to the shot.

**BATTERY**, in law, the striking, beating, or offering any violence to another person, for which damages may be recovered: but if the plaintiff made the first assault, the defendant shall be acquitted, and the plaintiff amerced to the king for his false suit.

Battery is frequently confounded with assault, though in law they are different offences; and the defendant may be found guilty of assault, though acquitted of the battery; there may therefore be an assault without a battery; but battery always implies an assault.

**BATTEURS d'Estrade**, are scouts sent out on horse-back before the front, and on the wings of an army, some miles distance, to make discoveries.

**BATTLE**, a general engagement between two armies, in a country sufficiently open for them to encounter in front, and for the greater part at least of the line to engage. Other great actions, though of a longer

duration, and perhaps attended with greater slaughter, are only called fights.

**BATTLE**, is also used figuratively for a representation of a battle in sculpture, painting, &c.

**BATTLE-AX**, a kind of halbert formerly used by the infantry, and first introduced into England by the Danes.

**BATTELEMENTS**, in architecture, are indentures or notches in the top of a wall, or other building, in the form of embrasures.

**BATTOLOGY**, in grammar, implies a superfluous repetition of some words or sentences.

**BAVINS**, in the military art, are faggots of brush wood, with the brush at length.

**BAUM**, *Melissa*, in botany, a genus of the didymia gymnospermia class. The calix is dry, and plain above; the upper lip of the corolla is vaulted and bifid: and the middle lobe of the under lip is cordated.

The infusions of this plant are sometimes drank as tea in chronical disorders, proceeding from debility and relaxation, and sometimes, acidulated with lemon juice, as a diluent in acute disorders. The distilled water is pretty strongly impregnated with the grateful flavour of the plant; and the essential oil, which is of a yellowish colour and very fragrant smell, is recommended by Hoffman as an excellent corroborant of the nervous system.

**BAY**, a gulph or inlet of the sea-coast, comprehended between two capes or points of land, where vessels frequently ride at anchor sheltered from the wind.

**BAY**, among farmers, that part of a barn where the corn is laid up, or the mow made. Thus if a barn consist of a floor and two heads, they call it a barn of two bays.

**BAY**, is also one of the colours of the coat of horses, and has, perhaps, its name from resembling the colour dried bay-leaves.

There are various degrees of this colour from the lightest bay to the dark, that approaches the nearest to the brown, but always more gay and shining.

**BAY**, among sportsmen, is applied to a deer, when after being hard run, he turns his head against the hounds, when he is said to stand at bay.

**BAY-SALT**. See the article **SALT**.

**BAY-TREE**, *Laurus*, in botany, a tree, well known in many of the English gardens. In hot countries it grows to a considerable height, has a smooth trunk without knobs and long branches. The leaves are long, sharp, hard, nervous, and smooth; but have little juice, though they have a fine smell, and an acrid, bitter, astringent taste. See **LAURUS**.

**BAYONET**, in the military art, a kind of short dagger, having an hollow iron handle to fix it on the muzzle of a musket, so that neither the charging or firing is prevented by its being fixed on the piece.

**BAYS**, in commerce, a sort of coarse woollen stuff, manufactured chiefly at Colchester and Bocking in Essex.

**BAZAR**, **BAZARI**, or **BAZAARD**, among the eastern nations, implies a market, or place set apart for trade, particularly among the Persians.

**BDELLIUM**, is a gummy resinous concreted juice, brought from Arabia and the E. Indies, in globes of different figures and magnitudes. It is of a dark reddish brown colour, and, in appearance, somewhat resembles myrrh; and is recommended as a sudorifick, diuretick, and uterine; and in external applications, for maturing tumours, &c. In the present practice, it is scarce otherwise made use of, than as an ingredient in theriaca.

**BEACHY-HEAD**, a cape or promontory on the coast of Sussex, between Hastings and Shoreham.

**BEACON**, any publick signal, to give warning against rocks, shelves, invasions, &c. It is also a signal erected on the sea-coast, or the top of some eminence, in order to give notice of the landing of an enemy.

**BEAD**, a small glass ball, made in imitation of pearl, and used in necklaces, &c.



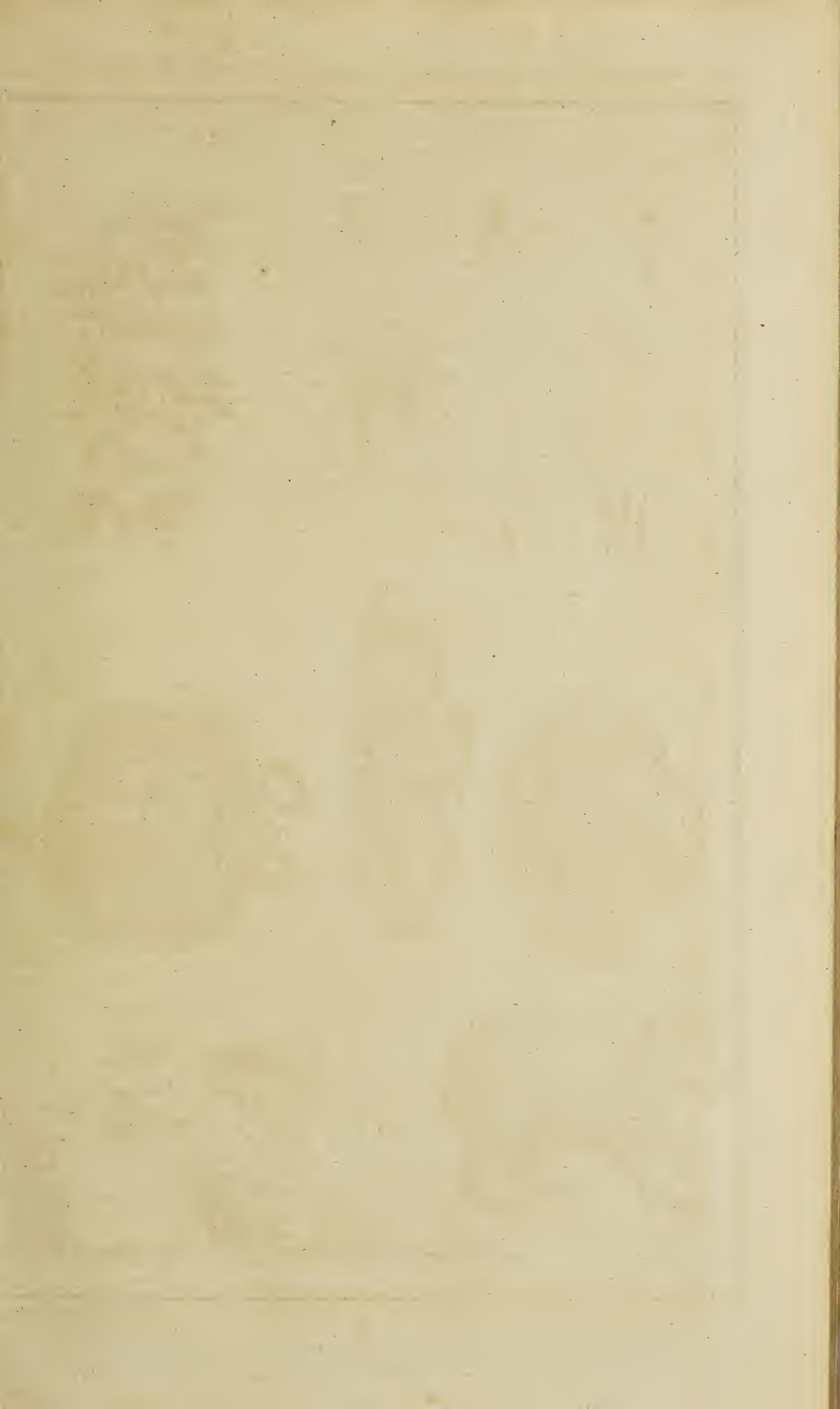




Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 12.



*Aranea Tarantula*

Fig. 5.



Fig. 6.



Fig. 8.

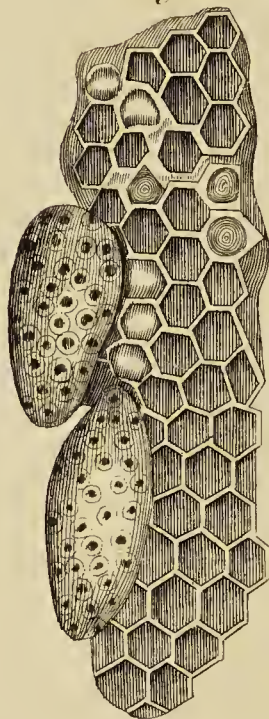


Fig. 7.

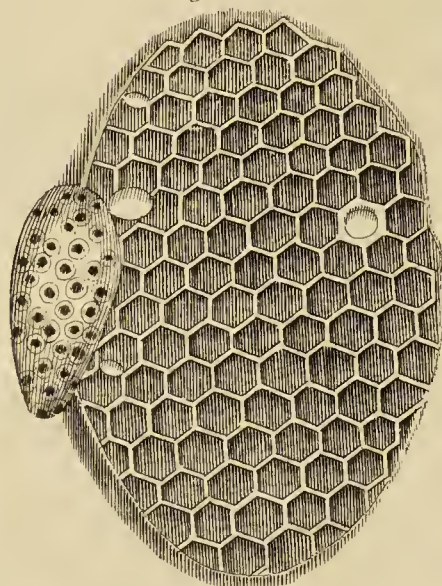


Fig. 9.

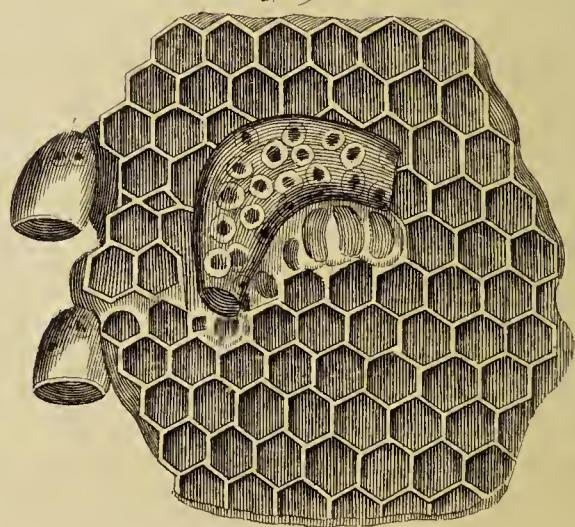


Fig. 11. Breach



Fig. 10. Bear Ursus





**BEAD**, in architecture, a round moulding, commonly made upon the edge of a piece of stuff, in the Corinthian and Roman orders, cut or carved in short embossments, like beads in necklaces.

**BEAD-proof**, among distillers, a fallacious way of determining the strength of spirits, from the continuance of the bubbles, or beads, raised by shaking a small quantity of them in a phial.

**BEAD-roll**, among papists, a list of such persons, for the rest of whose souls they are obliged to repeat a certain number of prayers, which they count by means of their beads.

**BEADLE**, a messenger or apparitor of a court, who cites persons to appear and answer in the court to what is alledged against them.

**BEADLE** is also an officer at an university, whose chief business it is to walk before the masters with a mace, at all publick processions.

**BEAGLE**, the name of a particular kind of hunting-dog, of which there are several sorts, viz. the southern beagle, which is something less than the deep-mouthed hound, and something thicker and shorter; the fleet-northern, or cat-beagle, which is smaller and of a finer shape than the southern beagle, and is a hard runner: there is also a very small beagle, which, though not bigger than a lady's lap-dog, will afford diversion in hunting the coney, or even a small hare in dry weather.

**BEAK**, the bill or nib of a bird.

**BEAK**, in architecture, the small fillet left on the head of a larmier, which forms a canal, and makes a kind of pendant.

*Chin* **BEAK**, a moulding the same as the quarter-round, except that its situation is inverted: this is very frequent in modern buildings, though few examples of it are found in the ancient.

**BEAK** or **BEAK-head**, of a ship, that part without the ship, before the fore-castle, which is fastened to the stem, and is supported by the main knee.

**BEAM**, in architecture, the largest piece of wood in a building, which lies cross the walls, and serves to support the principal rafters of the roof, and into which the feet of these rafters are framed.

**BEAMS of a Ship**, are the great main cross-timbers which hold the sides of the ship from falling together, and which also support the decks and orlops: the main beam is next the main-mast, and from it they are reckoned by first, second, third beam, &c. the greatest beam of all is called the *mid-ship beam*. See **SHIP**.

**BEAM-compass**, an instrument consisting of a square wooden or brass beam, having sliding sockets, that carry steel or pencil points; they are used for describing large circles, where the common compasses are useless.

**BEAM of a plough**, that in which all the parts of the plough-tail are fixed.

**BEAM**, or **ROLLER**, among weavers, a long and thick wooden cylinder, placed length-ways on the back part of the loom of those who work with a shuttle.

**BEAM**, in heraldry, the term used to express the main horn of a hart or buck.

**BEAM**, among hunters, the main stem of a deer's head, or that part which bears the antlers, royals, and tops.

**BEAM** is also the name of a sort of fiery meteor in the shape of a pillar; also a ray of the sun.

**BEAM-filling**, in building, the filling up of the vacant space between the rafter and the roof, with stones or bricks laid between the rafters on the rafter, and plastered on with loam, where the garrets are not pargeted, or plastered; as in country places, where they do not parget or plaster their garrets.

**BEAM of an anchor**, the longest part of it, called also the *shank*.

**BEAM-feathers**, in falconry, the longest feathers of a hawk's wing.

**BEAM** also denotes the lath, or iron of a pair of scales; sometimes the whole apparatus for weighing of goods is so called: thus we say, it weighs so much at the king's beam.

**BEAN**, *Faba*, in botany, the name of a genus of plants, whose flower is of the papilionaceous kind, and

from its cup there arises a pistil, which finally becomes a large pod, containing large, flattened, and, in some degree, kidney-shaped seeds. To this it is to be added, that the stalks are firm and erect, and the leaves stand by pairs, on a middle rib, which is terminated by an odd one.

Mr. Tournefort has enumerated eight species of this plant, but we have only the four following sorts, commonly sowed in our gardens. 1. The small Lisbon. 2. The Spanish. 3. The Sandwich. And, 4. The Windsor beans.

The first and second sorts are to be planted in October and November, under warm walls and hedges, where, if they stand through the winter, they produce beans early in the spring. They may also be raised very close in beds, and covered with hoops and mats in the winter; and in the spring planted out; but there is some hazard in the transplanting, and they will be a fortnight, or more, later than those which have stood the winter abroad.

The Lisbon bean is preferred to the Spanish; and the curious ought to have fresh seed every two years from abroad, for they are apt to degenerate, though not in goodness, yet in their earliness.

The Spanish and Windsor beans are not to be planted till Christmas, but especially the Windsor, which are subject, more than any other kind, to be hurt by the cold. These beans should have an open ground, and be planted at the distance of two feet and a half, row from row, and four inches from one another in the rows; but if the place is closely surrounded with hedges and walls, the distance must be greater, else the stalks will run high, but they will bear very little fruit. The Sandwich beans are hardier than the Windsor, and may be planted to come in between the early crops and them; and, though not much regarded at present, they are a very good bean.

The first plantation of Windsor beans should be made in the middle of January; and, after that, a new plantation should be made every three weeks, till the middle of May, that there may be a succession of crops.

**Kidney BEANS**, or *French BEANS*, the name of a well known plant, greatly cultivated in the English gardens.

There are many varieties of this plant brought from America, which it would be tedious, as well as superfluous to enumerate; especially as some of the old sorts are preferable to any of the new for the kitchen garden. There is, however, one sort which deserves to be particularly mentioned, and which has been long cultivated in the English gardens for the beauty of its scarlet flowers, from whence it is called the scarlet bean. This sort hath twisting stalks, which, if properly supported, will rise to the height of twelve or fourteen feet; the leaves are smaller than those of the common kidney-bean. The flowers grow in large spikes, and are much larger than those of the common sort, and of a deep scarlet colour; the pods are large and rough, and the seeds are purple marked with black. This sort requires no other treatment than the common sort, but the stalks should have tall stakes put down by them to twine round, otherwise they will fall to the ground, which will soon cause them to rot. Although this sort be chiefly cultivated for the beauty of its flowers, yet Mr. Miller recommends it as the best sort for the table; and adds, that whoever makes trial of this, will, he is persuaded, prefer it to all other kinds yet known.

**BEAN-COD**, a small fishing vessel among the Portuguese, generally navigated by one large long sail, the bottom of which stretches over the whole length of the deck, and the upper part tapers to a point, so that it nearly resembles a right-angled plain triangle. These are called lateen-sails.

**BEAN-TREFOIL**, in botany, a genus of plants with papilionaceous flowers, the vexillum of which is shorter than any of the other petals, and its fruit an oblong pod, containing kidney-like seeds. It may be added, that three leaves stand on every petal. Lemery says, that the leaves of bean-trefoil are laxative, and its seed emetick: but neither have obtained a place in our shops.

**BEAR**, *ursus*, in zoology, a genus of quadrupeds, of the order of the *feræ*, or beasts of prey, distinguished



guished by having only four teats, two on the breast, and two on the belly; also feet formed for climbing or walking, with five toes on each.

The tail of a common bear is abrupt; its fore teeth are of a conick figure; the canine teeth are placed at a distance from the grinders, and are two on each side; and the penis is long.

It is a large, but unfightly animal, and grows to different sizes, in different places, from that of a mastiff dog, to that of a small heifer. It is covered with a thick and deep fur; the head is large and long; the neck short, and very thick; the eyes are small, the thighs are long, but the under part of the legs short, and it has a knee pan at that joint. It is a native of America, and of many of the northern parts of Europe. See *plate IX. fig. 10.*

BEAR *Greater* and *Lesser*, in astronomy. See the articles *URSA Major* and *Minor*.

BEAR'S-BREECH, in botany. See *ACANTHUS*.

BEARD, the hair growing on the chin and adjacent parts of the face, chiefly of males, when arrived to full age.

BEARD of a *Comet*, in astronomy, the rays which the comet emits towards that part of the heavens whither it seems to direct its motion; and it is this that distinguishes the beard from the tail, which implies those rays that are emitted in the tract through which it has passed.

BEARD of a *Horse*, that part underneath the lower jaw, between the chin and the place where the curb rests.

BEARDED *Husk*, among florists, implies a husk that appears hairy on the edges; as that of a rose, &c.

BEARDING of *Wool*. See *WOOL*.

BEARER, in architecture, a post, pier, or wall, erected between the two ends of a piece of timber, to shorten its bearing, or to prevent its whole weight resting on the two ends only.

BEARER of a *Bill of Exchange*, the person in whose hands the bill is, and in favour of whom the last order was made.

When a bill is made payable to the bearer, it is understood to be payable to him in whose hands it is, after it becomes due.

BEARING, in navigation, an arch of the horizon, comprehended between the nearest meridian and any distant object, either discovered by the eye, or found by the finical proportion; as, at four P. M. we discovered Cape Malacha, bearing W. 64°. S. or, having the difference of latitude and longitude given, we find the bearing and distance by analogy.

BEARING of a *piece of Timber*, among carpenters, signifies the space either between its two fixed extremes, when it has no other support, which they call bearing at length, or between one extreme and a post, brick-wall, &c. trimmed up between the ends to shorten its bearing.

BEAST, in a general sense, an appellation given to all four-footed animals, fit either for food, labour, or sport.

BEASTS of burden, in a commercial sense, all four-footed animals which serve to carry merchandizes on their backs. The beasts generally used for this purpose, are elephants, dromedaries, camels, horses, mules, asses, and the sheep of Mexico and Peru.

BEASTS of the chace are five; viz. the buck, the doe, the fox, the roe, and the martin.

BEASTS and *fowls* of the warren, are the hare, the coney, the pheasant, and partridge.

BEASTS of the forest are the hart, hind, hare, boar, and wolf.

BEAT, in a general signification, signifies to chastise, strike, knock, or vanquish.

This word has several other significations in the manufactures, and in the arts and trades. Sometimes it signifies to forge and hammer, in which sense, smiths and farriers say, to beat iron; sometimes it means to pound, to reduce into powder: thus we say, to beat drugs, to beat pepper, to beat spices; that is to say, to pulverise them.

BEAT of drum, in the military art, is to give notice

by beat of drum of a sudden danger; or, that scattered soldiers may repair to their arms and quarters, is to beat an alarm, or to arms; also to signify, by different manners of founding a drum, that the soldiers are to fall on the enemy; to retreat before, in, or after an attack; to move, or march, from one place to another; to treat upon terms, or confer with the enemy; to permit the soldiers to come out of their quarters at break of day: to order to repair, to their colours, &c. is to beat a charge, a retreat, a march, &c.

BEATIFICATION, among papists, an act by which the pope declares a person beatified, or blessed after death.

BEATING, or PULSATION, in medicine, the reciprocal motion or palpitation of the heart. See the article *PULSE*.

BEATING *Flax* and *Hemp*. See *FLAX* and *HEMP*.

BEATING *Gold* and *Silver*. See *GOLD-BEATING*.

BEATING, in navigation, the act of making a progress against the wind, by tacking. See *TACK*.

Beating, however, is generally understood to be turning to windward in a storm or fresh wind.

BEATS of a *Watch* or *Clock*, are the strokes made by the fangs or pallets of the spindle of the ballance, or of the pads in a royal pendulum. See *CLOCK* and *WATCH*.

BEAVER, *Fiber*, in natural history, a creature about four feet in length, and twelve or fifteen inches broad. His skin, in the northern regions, is generally black, but it brightens into a reddish tincture in the temperate climates. He is covered with two sorts of hair, one long, and the other a soft down; the latter is that from which the beaver hats are manufactured; it is an inch in length, is extremely fine and compact, and accommodates the animal with a necessary warmth. The long hair preserves the down from dirt and humidity.

BEAUTY, in its native signification, is appropriated to objects of sight: objects of the other senses may be agreeable, such as the sounds of musical instruments, the smoothness and softness of some surfaces; but the agreeableness called beauty belongs to objects of sight.

Objects of sight are more complex than those of any other sense: in the simplest, we perceive colour, figure, length, breadth, thickness. A tree is composed of a trunk, branches, and leaves; it has colour, figure, size, and sometimes motion; by means of each of these particulars, separately considered, it appears beautiful; but a complex perception of the whole greatly augments the beauty of the object. The human body is a composition of numberless beauties arising from the parts and qualities of the object, various colours, various motions, figures, size, &c. all united in one complex object, and striking the eye with combined force. Hence it is, that beauty, a quality so remarkable in visible objects, lends its name to every thing that is eminently agreeable. Thus, by a figure of speech, we say, a beautiful sound, a beautiful thought, a beautiful discovery, &c.

BECHICKS, among physicians, medicines adapted to the cure of coughs. The word is formed from the Greek, *βηχ*, *βηχ*, a cough.

BED of the *Carriage of a Cannon*, the thick plank that lies under the piece, and forming, as it were, the body of the carriage.

BED, in masonry, a course or range of stones.

BED, in gardening, a square or oblong piece of ground, raised a little above the level of the adjoining ground, and in which seeds are sown, or plants set.

Hot BED. See *HOT-BED*.

BEDS of *Minerals*, certain strata or layers of matter disposed over each other.

Lords of the *BED-CHAMBER*, in the British customs, ten lords, who attend in their turns each week; during which time they lie in the king's bed-chamber, and wait upon him when he dines in private.

BED-MOULDING, in architecture, implies those members of a cornice placed below the coronet. A bed-moulding at present consists of an ogee, a list, a large boltine, and another list under the coronet.

BEE, in zoology, a well known insect, famous for its industry and oeconomy. See *APIS*.



**BEECH**, *Fagus*, in botany; a genus of the monoëcia polyandria class. The calix of the male is bell-shaped, and consists of five segments; it has no corolla, but twelve stamens: the calix of the female consists of four teeth; it has no corolla; the styli are three; and the capsule is muricated, has four cells and two seeds. There are three species; two of them natives of Britain, viz. the castanea, or chestnut-tree; and the sylvatica, or beech-tree. See **CASTANEA**.

The stagnated water gathered on the hollow of the beech-tree, is said to cure tetter-scabs and scurfs in man and beast by fomentation. Its leaves gathered about the fall, before they are much frost-bitten, afford the best mattresses to lay under quilts, instead of straw, as being very soft, and continuing sweet for seven years. When chewed, they are held good for the gums and teeth.

**BEECH-GALLS**, hard protuberances found on the leaves of the beech, wherein are lodged the maggots of a certain fly.

**BEECH-MAST**, the fruit of the beech-tree, said to be good for fattening hogs, deer, &c.

**BEECH-OIL**, an oil drawn by expression from the mast of the beech-tree, after it has been shelled and pounded. This oil is very common in Picardy, and used there, and in other parts of France, instead of butter; but most of those who take a great deal of it, complain of pains and a heaviness in the stomach.

**BEELE**, a kind of pick-ax, used by the miners for separating the ores from the rocks in which they lie: This instrument is called a *tubber* by the miners of Cornwall.

**BEER**, a common and well-known liquor, made with malt and hops. See **BREWING**, &c.

**BEER**, among weavers, a term that signifies nineteen ends of yarn, running all together the whole length of the cloth.

**BEER-MEASURE**. See **MEASURE**.

**BEESTING**, a term, used by country-people for the first milk taken from a cow after calving.

**BEET**, in botany. See **BETA**.

**BEETLE**, in the history of insects. See **SCARABÆUS**.

**BEETLE** also denotes a wooden instrument for driving piles, &c. It is likewise called a *stamper*, and by paviors a *rammer*.

**BEGHARDI**, *Beguardi*, a certain sect of hereticks, which arose in Germany, and in the Low-countries, about the end of the thirteenth century. They made profession of the monastical life, without observing celibacy; and maintained, if they are not scandalized by the monks, that man could become as perfect in this life as he shall be in heaven; herein resembling the arminian perfectionists of this day; they also held that every intellectual nature is of itself happy, without the succour of grace; and that he who is in this state of perfection ought to perform no good works, nor worship the host.

**BEGLERBEG**, in the Turkish polity, signifies a governor of one of the principal provinces in the Ottoman empire.

**BEGUINS**, congregations of devout young women, who maintain themselves by the work of their hands, leading a middle kind of life between the secular and religious. These societies consist of several houses placed together in one inclosure, with one or more churches, according to the number of beguins.

There is in every house a prioress, without whose leave they cannot stir out. Their vow is conceived in these terms: *I promise to be obedient and chaste, as long as I continue in this beguinage*. They observe a three years novitiate, before they take the habit, and the rector of the parish is their superior, but can do nothing without the advice of eight beguins. They are established in several parts of Flanders.

**BEHEN**, in the materia medica, the name of two roots, the one white, the other red; both accounted cordials and restorative, but the white one to possess these qualities in the highest degree. They are likewise said to be good in nervous cases; but neither are received into the present practice.

**BEIRAM**, a Turkish word, signifying a solemn fast, of which the Mahometans keep two in every year.

**BEL**, or **BELUS**, in mythology, the supreme God of the ancient Babylonians and Chaldeans.

**BEL AND THE DRAGON**, an apocryphal book of the Old Testament. Selden is of opinion that this little history should rather be considered as a sacred poem or fiction than a true account, and St. Jerome calls it, "The Fable of Bel and the Dragon."

**BELAY**, in the sea-language, is to make fast the ropes in their proper places.

**BELEMNITES**, in natural history, a substance concerning the nature of which there has been much dispute. Some maintain it to be a petrified animal; others will have it to be a fossil, &c. Linnæus refers the belemnites to the class of shells with several cells. The shape of the belemnites is sometimes conical, sometimes cylindrical; and they commonly consist of a black horny kind of substance. Their length is from two to eight inches; and their diameter from the sixth part of an inch to two or three inches. The inward part consists of rays; and there is generally a cell at the large end, and a furrow running from top to bottom. Dr. Plott says, that when scraped or burnt, they smell like horn. They are generally hollow about an inch deep, and filled with gravel. Their colour is various; some are ash-coloured, others bluish. They are commonly found in gravel-pits.

**BELENUS**, the titular deity of the ancient inhabitants of Italy and Gaul; being the same with Apollo or the sun, as appears from several ancient inscriptions found at Aquileia, and elsewhere.

**BELIEF**, the assent of the mind to the truth of any proposition.

**BELL**, a well known machine, ranked by musicians among the musical instruments of percussion.

The metal of which a bell is made, is a composition of tin and copper, or pewter and copper; the proportion of one to the other is almost twenty pounds of pewter, or twenty-three pounds of tin, to one hundred weight of copper.

Bell-metal is prohibited to be imported, as are hawk-bells, &c.

The constituent parts of a bell are the body or barrel, the clapper on the inside, and the ear or cannon on which it hangs to a large beam of wood.

**Diving BELL**: See the article **DIVING BELL**.

**BELL FLOWER**, in botany. See **CAMPANULA**.

**BELLA-DONNA**, in botany, a genus of plants classed among the pentandria monogyniæ, by Linnæus. The flower consists of a single petal, divided at the mouth into five segments. The fruit is a berry of a globular form, divided into two cells, each containing a number of small seeds.

**BILLING of Hops**, denotes their opening and expanding themselves.

**BELLIS**, the daisy, in botany. See **DAISY**.

**BELLON**, a distemper common in countries where they smelt lead-ore. It is attended with languor, intolerable pains and sensation of gripings in the belly, and generally costiveness.

Beasts, poultry, &c. as well as men, are subject to this disorder: hence a certain space round the smelting houses is called bellon-ground, because it is dangerous for an animal to feed upon it.

**BELLONIA**, in botany, a genus of the pentandria monogynia class. The corolla is rotated; the capsule consists of one cell inclosing many seeds. There is but one species, viz. the aspera, a native of America.

**BELLOWING**, among sportsmen, denotes the noise of roes in rutting-time.

**BELLOWS**, a machine so contrived as to expire and inspire the air by turns, by enlarging and contracting its capacity.

This machine is used in chambers and kitchens, in forges, furnaces and founderies, to blow up the fire: it serves also for organs and other pneumattick instruments, to give them a proper degree of air: all these are of various constructions, according to their different purposes, but in general they are composed of two flat boards, sometimes of an oval, sometimes of a triangular figure:



figure: two or more hoops, bent according to the figure of the boards, are placed between them; a piece of leather, broad in the middle, and narrow at both ends, is nailed on the edges of the boards, which it thus unites together: as also on the hoops which separate the boards that the leather may the easier open and fold again; a tube of iron, brass, or copper is fastened to the undermost board, and there is a valve within that covers the holes in the underboard, to keep in the air.

Each pair of bellows imported is valued in the book of rates at three shillings and four-pence, and pays duty  $7\frac{7}{10}\%$  d. whereof  $6\frac{7}{10}\%$  d. is drawn back on exportation.

*Water BELLOWS*, a machine for producing a constant current of air, by the fall of a stream of water. There are various machines of this kind used in several parts where there are founderies.

BELLY, in anatomy. See the article ABDOMEN.

BELOMANCY, a sort of divination by means of arrows, practised in the east, and particularly in Arabia.

BELTS, in astronomy, imply two zones surrounding the body of the planet JUPITER.

BEN. See the article BEHEN.

BENCAPED, among sailors. A ship is said to be bencaped when the water does not flow high enough to bring her off the ground, out of the dock, or over the bar.

BEND, in heraldry, one of the nine honourable ordinaries, containing a third part of the field when charged, and a fifth when plain. It is sometimes, like other ordinaries, indented, ingrailed, &c. and is either dexter or sinister.

BEND *dexter*, is formed by two lines drawn from the upper part of the shield on the right, to the lower part of the left, diagonally. It is supposed to represent a shoulder belt, or a scarf, when worn over the shoulder.

BEND *sinister*, is that which comes from the left side of the shield to the right: this the french heralds call a barre.

In BEND, is when any things, borne in arms, are placed obliquely from the upper corner to the opposite lower, as the bend lies.

BENDING, in a general sense, the reducing a straight body into a curve, or giving it a crooked form. The bending of timber-boards, &c. is effected by means of heat, whereby their fibres are so relaxed that you may bend them into any figure.

BENDING, in the sea-language, the tying two ropes or cables together: Thus they say, *bend the cable*, that is, make it fast to the ring of the anchor; *bend the sail*, make it fast to the yard.

BENDS, in a ship, the same with what is called wails, or wales; the outmost timbers of a ship's side, on which men set their feet in climbing up. They are reckoned from the water, and are called the first, second, or third bend. They are the chief strength of a ship's sides, and have the beams, knees, and foot-hooks bolted to them.

BENDY, in heraldry, is the field divided into four, six or more parts, diagonally, and varying in metal and colour. The general custom of England is to make an even number, but in other countries they regard it not, whether even or odd.

BENEDICITE, among ecclesiastical writers, an appellation given to the song of the three children in the fiery furnace, on account of its beginning with the word *benedicite*.

BENEDICTINS, in church-history, an order of monks, who profess to follow the rules of St. Benedict.

The benedictins, being those only that are properly called monks, wear a loose black gown, with large wide sleeves and a capuche, or cowl, on their heads, ending in a point behind. In the canon law, they are styled black friars, from the colour of their habit.

BENEFICE, in an ecclesiastical sense, a church endowed with a revenue for the performance of divine service; or the revenue itself assigned to an ecclesiastical person, by way of stipend, for the service he is to do that church.

BENZOIN, in materia medica, a concrete resinous juice, obtained from a large tree growing naturally in both the Indies. The resin is brought from the East

Indies in large masses, composed of white and light-brown pieces, with yellowish specks: it easily breaks betwixt the hands. That which is whitest is most esteemed. It has very little taste; but its smell is very fragrant and agreeable, especially when heated. The principal use of benzoin is in perfumes, and as a cosmetick; and enters in substance only into one officinal composition, the balsamum tranmaticum. But its flowers, which is a white saline concrete obtained by committing it to the fire in proper vessels, are recommended in disorders of the breast; and in this intention they are made an ingredient in the paregorick elixir, pectoral elixir, and pills, and in the troches of sulphur.

BERBERIS, the BARBERRY-BUSH, a genus of plants of the *hexandria-monogynia* class, the flower of which consists of six roundish, hollow, erecto-patent petals, and is scarce larger than the cup: the fruit is a cylindrick, obtuse, umbilicated berry, with one cell, containing two oblong, cylindrick, and obtuse seeds.

The fruit is very cooling and astringent, and good to quench thirst. The conserve of its fruit is of use in fluxes and the jaundice.

BERGAMOT, the name of a fragrant essence extracted from a fruit which is produced by ingrafting a branch of a lemon-tree upon the stock of a bergamot-pear. It is also the denomination of a coarse tapestry, manufactured with flocks of silk, wool, cotton, hemp, ox, cow, or goat's hair, and supposed to be invented by the people of Bergamo.

BERME, in fortification, a space of ground left at the foot of the rampart, on the side next the country, designed to receive the ruins of the rampart, and prevent their filling up the fosse.

BERNARDINES, an order of monks, founded by Robert abbot of Moleme, and reformed by St. Bernard. They wear a white robe with a black scapulary; and when they officiate they are clothed with a large gown which is all white, and hath great sleeves, with a hood of the same colour.

BERYL, in natural history, called by our lapidaries *aqua marina*, is a pellucid gem of a bluish green colour, found in the East Indies and about the gold mines of Peru: we have also some from Silesia, but what are brought from thence are oftener coloured crystals than real beryls; and when they are genuine, they are greatly inferior both in hardness and lustre to the Oriental and Peruvian kinds.

The beryl, like most other gems, is met with both in the pebble and columnar form, but in the latter most frequently. In the pebble form it usually appears of a roundish but flattened figure, and commonly full of small flat faces, irregularly disposed. In the columnar or crystalline form it always consists of hexangular columns, terminated by hexangular pyramids. It never receives any admixture of colour into it, nor loses the blue and green, but has its genuine tinge in the degrees from a very deep and dusky to the palest imaginable of the hue of sea-water.

The beryl, in its perfect state, approaches to the hardness of the garnet, but it is often softer; and its size is from that of a small tare to that of a pea, a horse-bean, or even a walnut.

BERYL-CRYSTAL, in natural history, a species of what Dr. Hill calls *ellipoma-crostitum*, or imperfect crystals, is of an extreme pure, clear, and equal texture, and scarce ever subject to the slightest films or blemishes. It is ever constant to the peculiarity of its figure, which is that of a long and slender column, remarkably tapering towards the top, and very irregularly hexangular. It is of a very fine transparency, and naturally of a pale brown.

BES, in roman antiquity, was the name both of weight and a measure. As the former it was equal to two thirds of the As, and as a measure, to two thirds of the jugurum.

BESANT, or BEZANT, a coin of pure gold, of an uncertain value, struck at Byzantium, in the time of the Christian emperors; from hence the gold offered by the king at the altar, is called besant, or bisant.

BESANTS, in heraldry, round pieces of gold, with-



without any stamp, frequently borne in coats of arms.

BESTIARII, in Roman antiquity, such as fought against beasts, or those who were exposed to them by sentence of the law.

BETA, the beet, in botany, a genus of the pentandria digynia class. The calix has four leaves; it has no corolla; the seeds are shaped like kidneys, and are situated within the base of the calix. There are two species, viz. the maritima or sea-beet, a native of Britain; and the vulgaris or green beet of Bauhinus, which is chiefly cultivated for culinary use. Decoctions of the vulgaris loosen the belly; and hence have been ranked among the emollient herbs. The juice expressed from the roots is a powerful errhine.

BETEL, in botany, the leaves of a tree, nearly resembling those of the long-pepper tree, found in Malabar, and other parts of the East-Indies. Its leaves are esteemed a cordial, and thought to give a fine flavour to the breath, in which intentions they are much used by the natives of those parts.

BETHLEMITES, a religious order, distinguished by their wearing a red star with five rays on their breast, in memory of the star which appeared to the wise-men, and conducted them to Christ at Bethlehem.

BETONY, in botany, the English name of the betonica, and of several species of veronica.

Betony is common in woods and shady places in England, and flowers in June or July; it is reckoned discutient and aperient, and has been always accounted an excellent medicine for the head; the leaves reduced to powder promote sneezing, for which reason, and for its being a cephalick, it is always an ingredient in the herb-snuff. Antonius Musa wrote a treatise about it, and commends it much as a vulnerary, especially in wounds of the head; and some recommend its juice boiled up to the consistence of honey, and mixed up with a small quantity of the Peruvian balsam, as a great healer. Besides the common betony, botanists enumerate six other species, which are natives of foreign countries.

BETULA, the birch-tree. See BIRCH-TREE.

BEVEL, the name of an instrument used by masons, carpenters, joiners, &c. for measuring angles. It is a kind of square, one leg of which moves on a centre, and may therefore be set to any angle.

BEVILE, in heraldry, a thing broken or opening like a carpenter's rule: Thus we say, he beareth argent, a chief bevilé, vert, by the name of *Beverlis*.

BEY, in the Turkish empire implies the governor of some town, or district.

BEY of Tunis, is the governor of that small republick, and has the same authority with the Dey of Algiers.

BEZANS, cotton cloths, which come from Bengal; some are white, and others striped with several colours.

BEZANTLER, the branch of a deer's horns next below the brow-antler.

BEZOAR, in natural history, is a stony concretion found in the stomach of several animals of the goat kind. It is composed of concentric coats surrounding each other, with a small cavity in the middle, containing a bit of wood, straw, hair, or the like substances.

There are two kinds of bezoar. The first, which is brought from Persia and the East Indies, is found in the stomach of the Capra Bezoardica, and esteemed by physicians to be the best. It is called *Oriental bezoar*, and is of a shining dark-green or olive-colour, and has an even smooth surface. On removing the outer coat, that which lies underneath is likewise smooth and shining. It is generally less than a walnut.

The second kind, called *Occidental bezoar*, is brought from the Spanish West Indies, has a rough surface, and less of a green colour than the Oriental. It is likewise much heavier, more brittle, and of a looser texture; the coats are thicker, and, on breaking, exhibits a number of striæ curiously interwoven. The Occidental is generally larger than a walnut, and sometimes as big as a goose-egg.

The great value of this stone in Persia and the East, and the little use it is found to be of in Europe, has

made many suspect that the true kind is never brought to us. Many of them are indeed evidently made by art. The usual mark to distinguish its being of a good quality, is its striking a deep green colour on white paper that has been rubbed with chalk. But it is of little importance to say much on this subject. The stone is nothing more than a morbid concretion, much of the same nature with the human calculus, of no smell or taste, indigestible in the stomach of the animal in which it is found, and scarce capable of being acted upon by any of the juices of the human body; and, notwithstanding its many boasted virtues, it cannot be considered in any other light than as an absorbent of the weakest kind. However, bezoar, on account of its high price, if it serves no other purpose, is of an excellent use in the apothecaries bill.

BEZOARDICK, an appellation given to whatever partakes of the nature of bezoar; also to compound medicines whereof bezoar makes an ingredient.

BIBLE, a name applied by Christians, by way of eminence or distinction, to the collection of sacred writings, or the holy scriptures of the Old and New Testament; known also by various other appellations, as, the Sacred Books, Holy Writ, Inspired Writings, Scriptures, &c. The Jews stiled the Bible (that is, the Old Testament) *mikra*, which signifies *Lesson*, or *Lecture*.

BIBLIOTHECA, according to its original signification implies a library, or a repository for books; but it is often used as the title of a treatise, containing an account of all the writers on some particular subject.

BICE, a blue colour much used by house painters, and prepared from the lapis Armenus.

BICEBEARS, the best body of all bright blues used in common work, as house-painting, &c. but it is the palest in colour. It works indifferently well, but inclines a little to sandy, and therefore requires good grinding. Next to ultramarine, which is too dear to be used in common work, it lies best near the eye of all other blues.

BICEPS, in anatomy, the name of several muscles: As the biceps humeri, or cubiti; biceps tibiæ, &c.

BICEPS, the name of several muscles of the human body. See the article *MUSCLES of the Human Body*.

BICKERN, the beak-iron of an anvil.

BICORNES, in anatomy, the name by which some writers call hyoides. See the article *HYOIDES*.

BIDENS, in botany, a genus of the syngenesia polygamia æqualis class. The receptacle is paleaceous; the pappus has erect scabrous awns; and the calix is imbricated. There are thirteen species, only three of which, viz. the tripartita or trifid water-hemp agrimony, the cornua or whole-leaved water-hemp agrimony, and the minima or least water-hemp agrimony, are natives of Britain. The leaves of the bidens are recommended for strengthening the tone of the viscera, and as an aperient; and said to have excellent effects in the dropsy, jaundice, cachexies, and scorbutick disorders.

BIGAMY, the possession of two wives at the same time. This is the interpretation of the word, in a law passed in 1 Jac. I. which makes bigamy felony.

Bigamy, in the canon law, is when a person either marries two women successively, or only marries one woman who had been married before. Both which cases are accounted impediments to be a clerk, or to hold a bishoprick.

Spiritual bigamy is when a person holds two incompatible benefices, as two bishopricks, two vicarages, &c.

BIGHT, among seamen, denotes one roll, or round, of a cable or rope, when coiled up.

BIGNESS, or MAGNITUDE. See MAGNITUDE.

BIGNONIA, in botany, a genus of the didynamia angiospermia class. The calix consists of five segments, and is shaped like a cup; the faux of the corolla is bell-shaped, and divided into five segments; the pod has two cells, and the seeds are membranaceous, and alated. The species are seventeen, all natives of America and the Indies.

BIGOT, a person foolishly obstinate and perversely wedded to any opinion, but particularly an opinion of a religious nature.



**BILANDER**, a small flat-bottomed vessel, with only one large mast and sail, and its deck raised half a foot above the plat-board.

**BILBOWS**, a punishment at sea, answering to the stocks at land. The offender is laid in irons, or stocks, which are more or less ponderous according to the quality of the offence of which he is guilty.

**BILE**, a yellow, bitter juice, separated from the blood in the liver, collected in the porus bilarius and gall bladder, and thence discharged by the common duct into the duodenum. The bile is properly of two kinds, and is distinguished under them by the names of *cylick* and *hepatick*. The *hepatick* bile is thin, almost insipid, and scarce coloured; the *cylick* bile is thicker, more coloured, and very bitter.

This last, most properly called bile, as the first is denominated gall, is separated immediately from the glands of the liver into the porus bilarius. Its nature is such as to resist acids, and being mixed with other fluids, to give them the like property; and by a chymical analysis is observed to afford some sulphur or oil, some volatile salt, and a good deal of fixed salt; in which particular it differs from all other animal liquors, and a moderate quantity of caput mortuum or earth: the basis is phlegm.

As to the manner in which the bile is secreted in the liver, there are various opinions. Some maintain, that the pores of the secretory glands of the liver, have a certain configuration and magnitude, to which the particles of the bile floating in the blood, being just answerable both in bulk and figure, are admitted in, and all the rest excluded. Others have recourse to a ferment which they suppose to reside in the liver, by means of which, the particles of the blood, in their passage through the secretory ducts, assume the form of bile. Others maintain, that the fluids contained in the blood of the vena porta, apply indifferently to the apertures of the secretory tubes, contiguous to the extremities of the vena porta, and to the extreme branches of the vena cava; that the pores of the cava being too little, and those of the porta large enough to admit certain particles, these being separated from the society of the essential part of the blood, and exposed to the action of the bilary vessels, constitute, a new humour distinct from the blood called bile. Dr. Keil accounts for the secretion of the bile, from the strong attraction between the particles of which it is composed. But all this is very systematical. As to the quantity of the bile secreted in the liver, we are ignorant, as Dr. Haller observes, of the velocity with which the blood of the mesentery circulates; we are ignorant of the causes which may either accelerate or retard its velocity; we have not the diameters of the vessels precisely ascertained, nor indeed do they remain invariably the same; and consequently were we to pretend to fix the quantity of bile secreted in the liver in any given time, we should certainly be very erroneous in our calculations.

The use of the bile is to attenuate the chyle, to mix the oleagenous parts of the blood with the aqueous, to stimulate the intestines, and in part to change the acid of the chyle. All these effects the *cylick* bile produces in a greater, and the *hepatick* in a lesser degree.

The bile is a juice of great importance with regard to the good or ill habit of the animal. We have already seen how it operates upon the chyle, the blood, &c. to which we may add, that it likewise assists in digestion, by promoting putrefaction. A redundancy of bile occasions many and terrible diseases, which, according to the seat of the humours, their acrimony or vent given them, will appear in the shape of a remitting or intermitting fever, a cholera, or dysentery. Too great an evacuation of the bile, either upwards or downwards, robs the chylefaction of its main instrument. Hence it prevents digestion, secretion, excretion of the faces, and produces an acid temperatue, coldness, weakness, paleness and swoonings. And if the bile be prevented in its discharge into the intestines, it produces a jaundice.

Of atra bilis, or black bile, Boerhaave distinguishes three sorts. 1st. The mildest, arising from the matter of the blood put into too great a motion, which hence takes the name of adust: the 2d is an aggravation of the

first, arising from the same causes, only heightened: and the 3d is a corrupt parched bile, which is the worst of all.

**BILGES**, in ship-building, are those parts at the bottom of the ship, that extend along each side of the keel from the lower part of the bow to the stern; and on which the ship rests when she lies aground.

**BILGE-WATER**, that which lies in the bilges, and therefore cannot flow into the pump-dell.

**BILINGUIS**, in law, signifies a jury composed of six Englishmen and six foreigners, for the trial of a cause between a native and a stranger.

**BILIOUS**, something relating to the bile, or that partakes of its nature.

**BILIOUS Fever**. See **FEVER**.

**BILL**, in mehanicks, a cutting instrument of iron, in the form of a crescent, used by husbandmen, gardeners, &c.

**BILL**, in trade, signifies an account of goods delivered to, or of work done for, a person.

**BILL of Credit**, an order given by a merchant or banker to a person, empowering him to receive money from his correspondents in foreign countries.

**BILL of Exchange**, a short order written on a slip of paper, by a merchant, &c. for paying to such a person, or his order, and in some countries to the bearer, in a distant place, a certain sum of money.

There are three things necessary to constitute a bill of exchange. 1. That it be drawn in one place upon some person in another. 2. That there be three persons concerned, the drawer, the presenter, or person in whose favour it is drawn, and the acceptor, or him on whom it is drawn. It must also mention that the value which the drawer has received, is either in bills of exchange, in money, merchandize, or other effects, which are to be expressed.

These bills are made payable either at sight, or so many days, weeks, or months after date; the space of a month being called usance, and two or three months after date, double or treble usance.

Bills of exchange are also either inland or foreign; the former is said to be only in the nature of a letter; but the latter is more regarded in law, because it is for the advantage of commerce with other countries, and consequently renders it an object of publick concern.

Not only the drawer, but also every indorser of a bill is liable to the payment of it; for an indorser charges himself in the same manner, as if he had originally drawn the bill: and the plaintiff, in an action in such a case, is not obliged to prove the drawer's hand, because the indorser becomes a new drawer. He must however prove that he demanded the money of the drawer or drawers, or that he made enquiry, and could not find them in convenient time; for by the custom established among merchants, the indorser is to receive the money of the first drawer if he can; but if he cannot the indorser must answer it. The forging a bill of exchange, or any acceptance, is felony.

**Bank BILLS**, are notes, or instruments which intitle a private person to part of the bank-stock.

**BILL of Entry**, an account of goods entered at the Custom-house, both inward and outward, wherein is expressed the merchant importing or exporting, the quantity of goods, the sorts, and from whence imported, or to what place exported.

**BILL of Lading**, an acknowledgement signed by the master of the ship, and given to a merchant, &c. containing an account of the goods which the master has received on board from that merchant, &c. with a promise to deliver them at the intended place for a certain sum of money. Each bill of lading must be treble, one for the merchant who ships the goods, another to be sent to the person to whom they are consigned, and the third to remain in the hands of the master of the ship. It must however be observed, that a bill of lading is only used when the goods sent on board a ship are but part of the cargo; for when a merchant loads a vessel entirely on his own account, the deed passed between him and the master of the ship is called charter-party.

**BILL of Parcels**, an account of goods bought, with their prices, given by the seller to the buyer.



**BILL of Store**, a kind of licence granted at the custom-house to merchants and captains of ships, to carry duty free, such stores as are necessary for the voyage.

**BILL of Sufferance**, is a licence granted at the custom-house to a merchant, permitting him to trade, without paying duty, from one English port to another.

**BILL**, is also the name of one of the chief weapons of defence with which nature has guarded the feathered tribe; it is also the principal instrument for gathering their food.

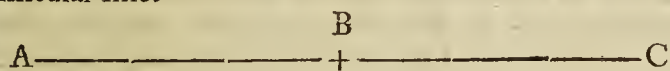
**BILLA VERA**, the bill is true, words written on the back of every bill found by the grand jury.

**BILLETS**, in heraldry, a kind of bearing in the form of a parallelogram, or long square. Most writers in heraldry take them for bricks; but Guillim says they represent billet-doux, or papers folded up.

**BILLETING**, in the army, implies the quartering soldiers in the houses of any town or village. And, among fox-hunters, it signifies the ordure and dung of a fox.

**BILLON**, in the history of coins, a composition of precious and base metals, where the latter predominate. Wherefore gold under twelve carats fine, is called billon of gold; and silver under six penny-weight, billon of silver.

**BIMEDIAL**, in mathematicks. If two medial lines, as AB and BC, commensurable only in power, containing a rational rectangle, are compounded, the whole line AC will be irrational, and is called a first bimedral line.



See Euclid. lib. X. prop. 38.

**BINARY Arithmetick**, a method of computation, first proposed by M. Leibnitz, and afterwards more fully explained by Joseph Pelican, of Prague.

In this method of computation, only the cypher and 1 are used, and the cypher multiplies every thing by 2. Thus 1 is one, 10 two, 11 three, 100 four, &c.

**BINARY Measure**, in musick, is a measure which is beaten equally, or where the time of rising is equal to that of falling. This is usually called common time. See **MUSICK**.

**BINARY Number**, that composed of two units.

**BIND-WEED**, *Convolvulus*. See **CONVOLVULUS**.

**BINN**, among husbandmen, &c. a place boarded up to keep corn in.

**BINNACLE**, in naval affairs, a kind of wooden chest fixed upon the quarter-deck, just before the helm, containing the compass, a candle, &c.

**BINOCULAR Telescope**, a telescope with two tubes fitted up in such a manner that the observer may see a distant object with both eyes at the same time.

**BINOMIAL Root**, in algebra, is a root consisting of two parts or members connected by the sign + or -. Thus  $a+b$ , and  $a-b$ , are binomial roots. The former consisting of the sum, and the latter of the difference of the quantities  $a$  and  $b$ .

**BINOMIAL Theorem**, a general method, invented by Sir Isaac Newton, for raising a given quantity to any given power, or extracting any given root thereof.

The powers of any binomial are found by a continual multiplication of it by itself. For example, the cube or third power of  $a+b$ , will be found by multiplication to be  $a^3+3a^2b+3ab^2+b^3$ ; and if the powers of  $a-b$  are required, they will be found the same as the preceding, only the terms in which the exponent of  $b$  is an odd number, will be found negative. Thus, the cube of  $a-b$  will be found to be  $a^3-3a^2b+3ab^2-b^3$ : where the second and fourth terms are negative, the exponent of  $b$  being an odd number in these terms. In general, the terms of any power of  $a-b$  are positive or negative by turns.

It is to be observed, that in the first term of any power of  $a+b$ , the quantity  $a$  has the exponent of the power required, that in the following terms, the exponents of  $a$  decrease gradually by the same differences, viz. unit, and that in the last terms it is never found. The powers of  $b$  are in the contrary order; it is never found in the first term, but its exponent in the second

term is unit; in the third term its exponent is 2, and thus its exponent increases till in the last term it becomes equal to the exponent of the power required.

As the exponents of  $a$  thus decrease, and at the same time those of  $b$  increase; the sum of their exponents is always the same, and is equal to the exponent of the power required. Thus in the sixth power of  $a+b$ , viz.  $a^6+6a^5b+15a^4b^2+20a^3b^3+15a^2b^4+6ab^5+b^6$ , the exponents of  $a$  decrease in this order 6, 5, 4, 3, 2, 1, 0; and those of  $b$  increase in the contrary order 0, 1, 2, 3, 4, 5, 6. And the sum of their exponents in any term is always 6.

In general, therefore, if  $a+b$  is to be raised to any power  $m$ , the terms, without their coefficients, will be,  $a^m, a^{m-1}b, a^{m-2}b^2, a^{m-3}b^3, a^{m-4}b^4, a^{m-5}b^5, \&c.$  continued till the exponent of  $b$  becomes equal to  $m$ .

The coefficients of the respective terms will be 1,  $m, m \times \frac{m-1}{2}, m \times \frac{m-1}{2} \times \frac{m-2}{3}, m \times \frac{m-1}{2} \times \frac{m-2}{3} \times \frac{m-3}{4}, m \times \frac{m-1}{2} \times \frac{m-2}{3} \times \frac{m-3}{4} \times \frac{m-4}{5}, \&c.$  continued until you have one coefficient more than there are units in  $m$ . See the article **COEFFICIENT**.

It follows, therefore, by these rules, that  $a+b^m=a^m \times m a^{m-1} b + m \times \frac{m-1}{2} \times a^{m-2} b^2 + m \times \frac{m-1}{2} \times \frac{m-2}{3} \times a^{m-3} b^3 + m \times \frac{m-1}{2} \times \frac{m-2}{3} \times \frac{m-3}{4} \times a^{m-4} b^4 +, \&c.$  which is the binomial, or general theorem, for raising a quantity consisting of two terms to any power  $m$ .

The same general theorem will also serve for the evolution of binomials, because to extract any root of a given quantity, is the same thing as to raise that quantity to a power whose exponent is a fraction that has its denominator equal to the number that expresses what kind of root is to be extracted. Thus, to extract the square root of  $a+b$ , is to raise  $a+b$  to a power whose exponent is  $\frac{1}{2}$ . Now  $a+b^m$  being found as above; supposing  $m=\frac{1}{2}$ , you will find  $a+b^{\frac{1}{2}}=a^{\frac{1}{2}}+\frac{1}{2} \times a^{-\frac{1}{2}}b+\frac{1}{2} \times -\frac{1}{4} \times a^{-\frac{3}{2}}b^2+\frac{1}{2} \times -\frac{1}{4} \times -\frac{1}{2} \times a^{-\frac{5}{2}}b^3+, \&c.=a^{\frac{1}{2}}+\frac{1}{2}a^{-\frac{1}{2}}b-\frac{1}{8}a^{-\frac{3}{2}}b^2+\frac{1}{16}a^{-\frac{5}{2}}b^3-, \&c.$

**BIOGRAPHER**, one who writes the lives of particular persons, as Plutarch, Suetonius, &c. See the next article.

**BIOGRAPHY**, a species of history which records the lives and characters of remarkable persons. The word is formed from the Greek  $\beta\iota\omicron\gamma\gamma\alpha$ , life, and  $\gamma\rho\alpha\phi\omega$ , to describe. This is at once the most entertaining and instructive kind of history. It admits of all the painting and passion of romance; but with this capital difference, that our passions are more keenly interested, because the characters and incidents are not only agreeable to nature, but strictly true. It is much to be regretted that this kind of history is so much neglected. No books are so proper to be put into the hands of young people.

**BIQUADRATICK Power**, in algebra, the fourth power of any number or quantity.

**BIQUADRATICK Root**, the root of a fourth power, or the square root of the square root.

**BIQUADRATICK Equation**, an equation where the highest power of the unknown quantity is of four dimensions.

**BIQUINTILE**, one of the aspects of the planets, when they are 144 degrees from one another.

**BIRCH-TREE**, *Betula*, in botany, a genus of plants, of the *monœcia-tetrandria* class: the male flower is amentaceous, formed of a number of monopetalous floscules, each of which is divided into four parts. In the female flower the calyx is lightly divided into three segments: the fruit is a cylindrick cone, and the seeds are on each side edged with a membrane.

The birch-tree is of use for the husbandman's ox-yokes, for hoops, small screws, paniers, brooms, wands, bavin-bands, withies for faggots, arrows, bolts, shafts, dishes, bowls, ladles: it is also good for fuel, great and small coal, the last being made by charring the



the slender brush and tops of the twigs and loppings. In Russia and Poland they cover houses with the bark of the birch-tree, instead of slate and tile.

BIRD, one of the six general classes of animals. See the articles ANIMALS and ORNITHOLOGY.

BIRTH, in midwifery. See DELIVERY.

BIRTH, or BIRTHING, in the sea language, a convenient place to moor a ship in; also a due distance observed by ships lying at anchor, or under sail; and a proper place aboard for a mess to put their chests, &c. is called the birth of that mess.

BIRTH-WORT, *Aristolochia*, in botany, a genus of plants ranged by Linnæus among the *gynandria hexandria* class. It has no calix; the corolla consists of one entire petal; and the capsule, which is below the flower has six cells. There are twenty-one species of aristolochia, none of which are natives of Britain.

The roots of this plant are said to be cephalick, vulnerary and uterine; and recommended highly in diseases of the breast: the principal virtue, however, now ascribed to them is that of promoting the menses, and the lochia after delivery.

BISERRULA, in botany, a genus of the diadelphia decandria class. The pod is plain, and has two cells. There is but one species, viz. the pelecinus, a native of Sicily.

BISHOP, an ecclesiastical person, entrusted with the spiritual government of a diocese.

It has been greatly disputed whether there were any bishops in the age of the apostles, or that order settled since their time. It is certain, that in the New Testament the names of bishops and priests are used indifferently; but tradition, the fathers, and the Apostolical Constitutions make a distinction. From this last consideration bishops are conceived as the highest ecclesiastical dignities, the chief officers in the hierarchy, or œconomy of church government, as the fathers and pastors of the faithful, the successors of the apostles, and, as such, the superiors of the church of Christ.

In the primitive church it appears that there was but one bishop in a church, and but one church to a bishop: the peculiar acts of the episcopal function were preaching the word, praying with the people, administering the two sacraments of baptism and the eucharist, taking care of the poor, ordaining of ministers, governing his flock, excommunicating offenders, and absolving of penitents. The election of a bishop was jointly in the hands of the clergy and laity of the bishoprick or parish which became vacant: when they elected a bishop, they presented him to the neighbouring bishops, for their approbation and consent, without which his election was not valid. A bishop thus chosen and ordained, always gave notice of his advancement to the most renowned bishops of the church.

As to the form of ordination, it was thus: two bishops held the book of the gospels over the head of that bishop which was ordained, and whilst one pronounced the blessing, or prayer of consecration, all the rest of the bishops that were present laid their hands upon his head.

In the church of Rome the pope has the chief right of electing bishops, nevertheless some princes have reserved to themselves the right of nominating to bishopricks, after which the pope sends his approbation, and the bulls to the new bishop. When a person hears that the pope has raised him to the episcopal dignity, he enlarges his shaven crown, dresses himself in purple, and if he be in Rome, he must go and receive the rochet from the pope: three months after having been confirmed in his election, he is consecrated in a very solemn manner.

Upon the vacancy of a bishop's see in England, the king grants his conge d'elire to the dean and chapter, to elect the person whom, by his letters missive, he hath appointed; and if they do not make the election in twenty days, they are to incur a premunire. The dean and chapter having made their election accordingly, the archbishop, by the king's direction, confirms the bishop, and afterwards consecrates him, by imposition of hands, according to the form laid down in the Common Prayer Book. Hence we see that a bishop differs from an arch-

bishop in this, that an archbishop with bishops consecrates a bishop, as a bishop with priests consecrates a priest: other distinctions are, that an archbishop visits a province, as a bishop a diocese; that an archbishop convokes a provincial synod, as a bishop does a diocesan one; and that the archbishop has canonical authority over all the bishops of his province, as a bishop has over the priests of his diocese.

The jurisdiction of a bishop of the church of England consists in collating benefices, granting institutions, commanding inductions, taking care of the profits of vacant benefices for the use of the successors, consecrating churches and chapels, ordaining priests and deacons, confirming after baptism, granting administrations, and taking probates of wills: these parts of his function depend upon the ecclesiastical law. By the common law, he is to certify to the judges concerning legitimate and illegitimate births and marriages: and to his jurisdiction, by the statute law, belongs the licensing of physicians, surgeons, and schoolmasters, and the uniting of small parishes, which last privilege is now peculiar to the bishop of Norwich.

All bishops of England are peers of the realm, except the bishop of Man, and as such sit and vote in the house of lords: they are barons in a threefold manner, viz. feudal, in regard to the temporalities annexed to their bishopricks; by writ, as being summoned by writ to parliament; and lastly, by patent and creation: accordingly they have the precedence of all other barons, and vote as barons and bishops, and claim all the privileges enjoyed by the temporal lords, excepting that they cannot be tried by their peers, because, in cases of blood, they themselves cannot pass upon the trial, for they are prohibited, by the canons of the church, to be judges of life and death.

BISHOP'S-COURT, an ecclesiastical court, held by the bishop's chancellor in every cathedral, where causes are determined according to the civil and canon law.

BISHOPRICK, a diocese, or the district over which a bishop's jurisdiction extends.

There are twenty-four bishopricks, and two archbishopricks in England, and in Ireland eighteen of the former and four of the latter.

BISKET, or BISCUIT, a general name for the bread used in the sea-service, especially in long voyages.

Bisket, in order to be good, should be made six months before it is put on board a ship; it should also be made of good wheat flour, thoroughly cleaned from the bran.

BISMILLAH, a solemn form used by the Mahometans at the beginning of all their books, and other writings, signifying, *in the name of the most merciful God.*

BISMUTH, a ponderous brittle semi-metal, resembling zinck and the regulus of antimony, but differing greatly from them in quality. It dissolves with vehemence in the nitrous acid, which only corrodes the regulus of antimony; and is scarce soluble in the marine acid, which acts strongly on zinck. A calx and flowers of bismuth have been recommended as similar in virtue to certain antimonial preparations; but are at present of no other use than as a pigment or cosmetick.

Bismuth is sometimes found native, in small compact masses, of a pale lead colour on the outside, but a silvery white within. It attenuates the parts of all other metals, and thereby promotes their fusion. When dissolved in strong acids, it yields the famous cosmetick magistery, and is a very valuable ingredient in the mixed metals used in casting types, and for bell-metal.

Bismuth is very common in Germany, and not unfrequently found in the tin-mines of Cornwall, though little known, or at least regarded, there.

BISNOW, a sect of the Banians, who never eat flesh of any kind, but subsist entirely on herbs, pulse, butter and milk.

BISSECTION, in geometry, the dividing a line, angle, &c. into two equal parts.

BISSEXTILE, in chronology, a year consisting of 366 days, being the same with our leap year. The day also which is this year added, is called bissextile.

The true solar year, or that space of time which flows while the sun is moving from any one point of the



the ecliptick till he returns again to the same point, consists of 365 days, 5 hours, 48 minutes, 57 seconds. But the year made use of by the ancient Egyptians, consisted of 365 days only, which being about six hours less than the true solar year, they lost a day nearly every four years. This inconveniency did not escape the observation of Julius Cæsar, who being then priest among the Romans, ordered that every fourth year should have an additional or intercalary day; and that the sixth of the calends of March should be that year reckoned twice: and hence both the intercalary day, and the year wherein it happened, were called bissextile. This method of computation is called the Julian account, or Old Style.

But as the true solar year consists of 365 days, 5 hours, 49 minutes nearly, it follows that, according to this way of reckoning, the civil year will, at the end of every four years, begin 44 minutes sooner than it did before, and consequently it will, in 331 years, anticipate one whole day. This induced pope Gregory XIII. in the year 1582, to attempt a reformation of the calendar; and finding that the equinox had then anticipated, since the Nicene council held in the year 325, ten whole days, he ordered that these ten days should that year be taken out of the calendar, and that the eleventh of March should be called the 21st. He also ordered, that every hundredth year, which according to the Julian form was to be bissextile, should be a common year, consisting of 365 days only: but because this was too much, every four hundredth year was to remain bissextile. This method of computation is called the Gregorian account, or New Style; and was immediately followed in most foreign countries. Great-Britain however still followed the Old Style, till the year 1752, during which interval one day more was anticipated. It was therefore ordered, by act of parliament, that eleven days should that year be taken out of the calendar, and that the natural day following the second of September, should be called the fourteenth, omitting the intermediate eleven days; and that the New Style should for the future be observed. By this correction the feasts and fasts of the church are now kept according to the original decision of the council of Nice.

**BISTORTA**, *Bistort*, or *Snakeweed*, in botany, a genus of octandrious plants, of which there are several species. The root of this plant is only in use, and is said to be balsamick, vulnerary, and astringent, and therefore used against all kinds of fluxes, particularly hæmorrhages, spitting of blood and vomiting; it has been sometimes given in intermitting fevers, and sometimes also in small doses as corroborant and antiseptic in acute and malignant fevers; the common dose of bistort root is from fifteen to twenty grains, and in urgent cases, it is extended to a dram. This genus is classed by Dr. Linnæus with the polygonum. It flowers in May, and produces new spikes until August, and grows well in divers parts of England.

**BISTOURY**, an instrument used in surgery, for making incisions, and of which there are several sorts, adapted to the various operations necessary to be performed in the practice of surgery.

**BISTRE**, or **BISTER**, among painters, is the name of a warm transparent, deep brown colour, extracted from wood foot.

**BIT**, a well known part of a horse's bridle.

**BIT**, among mechanicks, signifies the point or top of an auger, piercer, &c.

**BIT** of a Key, that part which contains the wards.

**BITS**, in ship-building, a frame composed of two pieces of timber, fixed perpendicularly in the fore-part of the ship, on which the cables are fastened when she rides at anchor.

**BITTER**, an epithet applied to all bodies that have a taste opposite to sweetness.

**BITTER-APPLE**, *Colocynthis*, in the materia medica. See the article **COLOCYNTHIS**.

**BITTERN**, in zoology, the English name of a bird frequenting boggy and sedgy places, and about the size of a heron.

**BITTERN**, in the salt works, a liquor of a redish

brown colour, and nauseous bitter taste; remaining in the salt pans after the salt is crystalized. From this liquor the much greater part of the salts sold under the name of Epsom and Glauber's salt are extracted.

**BITUMEN**, in natural history, an inflammable fossile substance, otherwise called asphaltum. See the article **ASPHALTUM**.

Besides the bitumen Judaicum mentioned under the article **ASPHALTUM**, there are other kinds, viz. A hard stinking black kind, found in great plenty about the dead-sea; it yields an oil which is an excellent cement, and is supposed to be the bitumen which we are told supplied the place of mortar in building the walls of Babylon. The brownish black stinking bitumen, is common in Germany, and even with us, under the name of pitch-stone.

**BITUMINOUS**, something belonging to, or partaking of the nature of bitumen. See **BITUMEN**.

**BIVALVES**, a term sometimes used for such shells as consist of two pieces. It is also an appellation given to such pods, or capsules, as consist of two valves inclosing the seeds.

**BIVENTER**, in anatomy, called also digastrick, or two-bellied, a muscle of the lower jaw.

**BIXA**, in botany, a genus of the polyandria monogynia class. The corolla consists of ten petals; the calix has five teeth; and the capsule is rough, and double valved. There is but one species, viz. the orelana, a native of America.

**BIZARRO**, in the Italian musick, denotes a fanciful kind of composition, sometimes fast, slow, soft, strong, &c. according to the fancy of the composer.

**BLACK**, a well known colour, supposed to be owing to the absence of light; all the rays thereof being absorbed by the black bodies. See **OPTICKS**.

**BLACK**, among dyers, one of the five simple and mother colours used in dying. It is made differently, according to the several qualities of the stuffs that are to be dyed. For stuffs of a high price, as woollen cloth an ell and a half or an ell and a quarter wide, broad and narrow rattens, fine woollen druggets, &c. they must use a black made of the best woad and indigo, inclining to a bluish brown.

**BLACK-GRASS**, a species of grass in America, and lately introduced into England. The following account of this grass is given by the late Dr. Elliot of New-England.

"We have, says that worthy writer, in a letter to Mr. Mills, an excellent sort of grass in our salt marshes. It thrives best, and grows largest, in those meadows which border on tide-rivers, and have the greatest mixture of fresh-water. Where the water is very salt it is not apt to fix and spread; but will remain short and poor. It is very tender, and cuts as easily as garden cives, grows thicker and taller than the common salt-marsh grass, and affords from two to three tons of hay to the acre: but it is a slow grower, after it has been cut. Its seeds are small, like those of tobacco. The colour of this grass is a very deep green, which renders it so conspicuously different from every other kind, that it is universally known by the name of Black grass."

**BLACK Land**, in agriculture, a term by which the husbandmen denote a particular sort of clayey soil, which however they know more by its other properties than by its colour, which is rarely any thing like a true black, and often but a pale grey. This, however pale when dry, always blackens by means of rain; and when plowed up at those seasons, it sticks to the plough-shares; and the more it is wrought, the muddier and duskier-coloured it appears. This sort of soil always contains a large quantity of sand, and usually a great number of small white stones.

**Lamp-BLACK**, is the foot of oil collected as it is formed by burning. It is made by burning oil in a number of large lamps in a confined place, from whence no part of the fumes can escape; and where the foot formed by these fumes, being collected against the top and sides of the room, may be swept together and collected.

**Ivory-BLACK**, is the coal of ivory or bone, formed



by giving them a great heat, all access of air to them being excluded.

*Blue-BLACK*, is the coal of some kind of wood, or other vegetable matter; burnt in a close heat where the air can have no access. The best kind is said to be made of vine stalks and tendrils.

*Currier's-BLACK*, signifies a tint or dye laid on tanned leather; of which there are usually two, the first made of galls, four ale, and old iron; the second of galls, copperas, and gum-arabick.

*Earth-BLACK*, a sort of coals found in the ground, which the painters and limners use to paint in fresco, after it has been well ground.

*BLACK-LEGS*, a name given in Leicestershire to a disease frequent among the calves and sheep. In Staffordshire they call it the wood-evil.

It is a white jelly, and sometimes a bloody jelly, settling in their legs, from whence it has its name of black-legs, and often in the neck between the skin and flesh, which will make them carry their necks awry. If it falls on the joints they overcome it; but if in their bowels they die, nor is there any cure.

*BLACK OATS*, a species of oats greatly cultivated in the northern parts of England, being esteemed a very hearty food for horses. See the article *OATS*.

*BLACK THORN*, a species of bushes well known, and much used in making fences, &c.

It is not reckoned quite so good for fences as the white thorn, because it is apt to run more into the ground, and is not so certain of growing; but then the bushes are much the best, and most lasting of any for dead hedges, or to mend gaps: nor are cattle so apt to crop them as the other. They will grow on the same sort of soil with the white thorn; but the richer the mould is, the more they will prosper.

*BLACK STREAKS in a Ship*, are the planks placed immediately below the bend. They are covered with tar mixed with lamp-black, and form a beautiful contrast with the white bottom below, and the scraped planks covered with a mixture of rosin and tallow above.

*BLADDER*, in anatomy, a thin membranous substance, found in several parts of animal bodies, serving as a receptacle for some fluid, or liquid excrement, as the urinary-bladder, the gall-bladder, &c.

The urinary bladder is a membranaceous hollow body, of the figure of a pear, situated in the pelvis, and destined to collect, and at a proper time to expel the urine. Its size is such, that it will conveniently hold about a pint in adults; but is capable of distention, so as to hold much more. It is connected, in the human body, in a singular manner, by the peritonæum to the os pubis, otherwise than in other animals: it is also connected with the parts of generation by the urethra; with the navel by the urachus and umbilical arteries; and finally, in men, with the intestinum rectum; and in women, with the vagina. It is divided into three parts, the body, the neck, and the fundus or bottom. The coats of the bladder are much thinner in the body and the fundus than they are at the neck. Its blood-vessels come from the hypogastrick, the umbilical, and the hæmorrhoidal vessels in men; and in women, from the spermaticks also. Its nerves are from the intercostals, and principally from those of the os sacrum.

Its structure is membranaceous, and consists of three coats: the first is called the common membrane; this is continuous with the peritonæum, and surrounds only the bottom of the bladder. The second coat is muscular, and is composed of several fibres, running in various directions, but principally longitudinal and transverse. The third, or inner coat, is nervous and is covered with a peculiar fluid of a mucous nature, which is secreted in glands situated in this coat, and principally in that part which is near the neck of the bladder. The sphincter of the bladder is composed of a series of transverse fibres, running cross-ways under the straight fibres of the neck of the bladder, in form of a circle, and serving to close it, to prevent the involuntary discharge of the urine. The bladder has three foramina; two where the ureters enter in, at which

the urine is thrown into the bladder; and one, much larger than these, in the neck, for the discharge of the urine into the urethra.

*Air BLADDER*. See the article *AIR-BLADDER*.

*BLANCHING*, in a general sense, implies the act of bleaching or whitening.

*BLANCHING*, among gardeners, an operation whereby certain plants, &c. are rendered whiter, and more tender, than otherwise they would be.

*BLANK*, a white, or void space left in writing, &c.

*BLANK-VERSE*, in modern poetry, composed of a certain number of syllables, without the assistance of rhyme.

*BLANKET*, a coverlet for a bed: a stuff commonly made of white wool, and wrought in a loom like cloth; with this difference, that they are crossed like serges.

*BLASPHEMY*, an indignity or injury offered to the Almighty, by denying what is his due, and of right belonging to him; or by attributing to the creature that which is due only to the Creator.

*BLAST*, a violent explosion of air. Among miners it signifies a damp, or suffocating vapour. See *DAMP*.

*BLASTING*, among mines, &c. signifies the bursting or blowing up rocks by means of gunpowder.

*BLAZE*, a white streak in a horse's face.

*BLAZING-STAR*. See the article *COMET*.

*BLAZONING*, or *BLASONRY*, in heraldry, implies the art of decyphering the arms of a noble family.

*BLEA*, in the anatomy of plants, the inner rind or bark.

*BLEACHING*, the art or method of whitening silks, linens, stuffs, hair, wax, &c.

*BLEACHING of Silk*. The silk being raw, is put into a bag of fine linen, and thrown into a vessel of boiling river-water, in which had been dissolved good Genoa or Toulon soap. After boiling for some hours, it is taken out to beat, and then is washed in cold water, rung slightly, and put a second time into the boiling vessel, filled with cold water, mixed with soap and a little indigo, which gives it a bluish cast. When it is taken out of this second water, they wring it hard, untwist it, and separate the threads; then they suspend it in the air in a kind of stove, where they burn sulphur, the vapour of which mineral gives the last degree of whiteness to the silk.

*BLEACHING of Woollen Stuffs* is performed three different ways. 1. With water and soap. 2. With the vapour of sulphur. And, 3. With chalk, indigo, and the vapour of sulphur.

*BLEACHING of Coarse Linens*. After they are taken from the loom, they are laid in wooden frames full of cold water, where they are beaten with wooden hammers, and purged from the filth; then they are spread upon the ground to receive the dew for eight days; after which they are put into wooden tubs, with hot lye poured over them. Having been thus lixiviated, they are again purged in a mill, and the former process repeated, till they have acquired their just degree of whiteness.

*BLEACHING Fine Linens*. After they are taken from the loom, they are put to soak in clear water, and when they have been well cleansed, are thrown into a bucking-tub filled with cold lye, made of wood ashes and water. When they are taken out of the lye, they are washed in fair water, spread in a meadow, and frequently watered from little canals, by means of scoops or hollow shovels. After lying a certain time on the ground, they are passed through a fresh lye poured on hot, and made differently, according to the condition of the linens. Being taken out of this second lye, and every thing repeated as before, they are passed through a soft lye, rubbed with black soap, which finishes the whitening of the selvages; and the soap being washed off, they are put to soak in cow's milk without the cream. This perfects their bleaching, gives them the proper softness, and makes them cast a little nap. Being taken out of the milk, they are washed in water for the last time. After all this process, the linen gets its first blue by passing through a water, in which a little starch,



starch, smalt, and dutch lapis have been steeped: In the last place, the proper stiffness and lustre is given with starch, smalt, and other gums, the quantity and quality of which may be adjusted according to the occasion.

**BLEACHING of Hair** is done by washing it as linen, in a suitable lixivious water, and afterwards spreading it upon the grafs.

**BLEEDING**, or Phlebotomy, in surgery. See the article **PHLEBOTOMY**,

**BLEEDING at the Nose**. See **HÆMORRHAGE**.

**BLEYME**, an inflammation arising from bruised blood between a horse's sole and the bone of the foot, towards the heel. Of these there are three sorts, which are generally bred in spoiled wrinkled feet, with narrow heels, and are usually seated in the inward or weakest quarter: In this case the hoof must be pared, and the matter let out: then let oil *de merveille* be poured in, and the hoof be charged with a remolade of foot and turpentine.

**BLIGHT**, in husbandry, a disease incident to plants, which affects them variously, the whole plant sometimes perishing by it, and sometimes only the leaves and blossoms, which will be scorched and shrivelled up, the rest remaining green and flourishing.

The true cause of blights seems to be continued dry easterly winds for several days together, without the intervention of showers, or any morning dew, by which the perspiration in the tender blossom is stopped; and if it so happens, that there is a long continuance of the same weather, it equally affects the tender leaves, whereby their colour is changed, and they wither and decay.

The best remedy for this distemper, is gently to wash and sprinkle over the tree, &c. from time to time with common water; and if the young shoots seem to be much infected, let them be washed with a woollen cloth, so as to clear them, if possible, from this glutinous matter, that their respiration and perspiration may not be obstructed. This operation ought to be performed early in the day, that the moisture may be exhaled before the cold of the night comes on: Nor should it be done when the sun shines very hot.

Another cause of blights in the spring, is sharp hoary frosts, which are often succeeded by hot sunshine in the day time: This is the most sudden and certain destroyer of the fruits that is known.

**BLIND** See **BLINDNESS**.

**Pore-BLIND**, or **pur-BLIND**. A person who is very short-sighted is said to be *pur-blind*.

**Moon-BLIND**, denotes horses that lose their sight at certain times of the moon.

**BLIND** is also figuratively, for things without apertures; Thus we say, *a blind wall*, *a blind alembick*, &c.

**BLIND**, among traders, a kind of false light which they have in their warehouses and shops, to prevent too great a light from diminishing the lustre of their stuffs.

**BLINDNESS**, a total privation of sight, arising from an obstruction of the functions of the organs of sight, or from an entire deprivation of them.

**BLINDNESS**, in farriery. When a horse becomes blind, it may be thus discerned: His walk or step is always uncertain and unequal, so that he does not set down his feet boldly when led in one's hand: But if the same horse be mounted by an expert horseman, and if he be a beast of metal, then the fear of the spurs will make him go resolutely and freely; so that his blindness can hardly be perceived.

**BLINDS**, or **BLINDES**, in the art of war, a sort of defence commonly made of oziars, or branches interwoven, and laid across between two rows of stakes, about the height of a man, and four or five feet asunder, used particularly at the heads of trenches, when they are extended in front towards the glacis; serving to shelter the workmen, and prevent their being overlooked by the enemy.

**BLISTER**, in medicine, a thin bladder containing a watery humour, whether occasioned by burns, and the like accidents, or by vesicatories laid on different parts of the body for that purpose.

**Cantharides**, or spanish flies, applied in the form of a plaster, are chiefly used with this intention.

**BLITE**, *blitum*, in botany, a genus of the *monandria-digynia* class of plants. It has no flower petals: the fruit is a berry-like capsule, of an oval figure, and somewhat compressed; the seed is single, of a globular figure, compressed, and nearly of the size of the capsule.

Blite, on account of its cooling and emollient qualities, is recommended in dysenteries and spitting of blood.

**BLOCKS**, in the marine, imply little wooden machines artfully disposed among the rigging of a ship, so as to give additional power to the ropes that command the necessary mechanism aloft: such as extending, contracting, or traversing the sails, by hauling in certain cords on the deck. It would be difficult to describe the figure of a block, as they are of such various sizes, shapes, and powers, single, double, and even six or seven-fold, so denominated from the number of sheaves they contain.

The cat-block is for drawing the anchor up to the cat-head.

The swivel in the iron-bound block is to turn it, that the parts of the purchase affixed to it, called the tackle, may not be twisted round each other, which would greatly diminish its force.

The top-block is to hoist up or lower the top-masts, and is hooked in a bolt driven in the cap.

The clue-garnet blocks are fixed to the clews or lower corners of the sails, and are for drawing them up to the yard, when the sail is to be contracted or furled.

**BLOCKADE**, in the art of war, the blocking up a place, by posting troops at all the avenues leading to it, to keep supplies of men and provisions from getting in to it; and by these means proposing to starve it out, without making any regular attacks.

To raise a blockade, is to force the troops that keep the place blocked up, from their posts.

**BLOMARY**, or **BLOOMARY**, in metallurgy, the first forge through which iron passes, after it is melted out of the ore.

**BLOOD**, a well known fluid, which circulates through the arteries, veins, &c. of animal-bodies, and nourishes all their parts.

Blood is composed of a thin watery liquor called *serum*; and a thick red part called *crassamentum*, which, when viewed by the microscope, appears to consist of red globules of a certain determined magnitude. These globules are generally believed to be of the same magnitude in all animals that have red blood.

As blood is originally derived from our aliment, it must consist of the same principles, and consequently abound with salts and oils. The salts of the blood are partly of the fixed neutral kind, and partly such as are rendered semi-volatile by the heat and motion to which they are subjected: Both irritate the sensible nervous parts of animals; for it is well-known that any kind of salt applied to the eye gives great uneasiness. From these qualities of blood the late learned and celebrated Dr. Whytt concluded that it must be well fitted to communicate a gentle stimulus to those sensible nerves which terminate on the internal surface of the auricles and ventricles of the heart; and consequently that the contraction of the heart is principally owing to this cause. The diameter of a red globule is computed to be about  $\frac{1}{2000}$  part of an inch.

Authors are not agreed in regard to the quantity of blood contained in the human body; some making it only 10 pounds, whilst others make it to be 20, 60, or even 100 pounds: But then these last comprehend the juices of the lymphatick vessels under the term blood. As to the quantity of current blood in a horse, the ingenious Dr. Hales found it to be, at a low computation, 1105 cubick inches, or 422 pounds.

**Circulation of the BLOOD**. See **CIRCULATION**.

**Heat of the BLOOD**. See the article **HEAT**.

**Ebullition of the BLOOD**, a disease in horses, which proceeds from want of exercise, and gives rise to outward swellings, frequently mistaken for the farcin.

**BLOOD running itch** happens to a horse by the blood's being over-heated by hard riding or other labour. As the



the blood gets between the skin and the flesh, it makes a horse rub and bite himself, and if neglected will turn to a grievous mange.

**BLOSSOM**, a general name for the flower of plants, but more especially of fruit-trees.

**BLOSSOM**, or **PEACH-COLOUR**, among horsemen, implies a horse that has his hair white, intermixed with sorrel or bay hairs.

**BLOW-PIPE**, a hollow tube used by several artificers, as jewellers, enamellers, &c. for increasing the force of the flame of their lamp.

**BLOWING of a Flower**, among gardeners, implies the care taken to produce flowers in the highest perfection, particularly auriculas and carnations.

The usual method; with respect to the latter is this. When the flower stems begin to shoot, or, as the florists say, to spindle, a stick four feet long is fixed in the ground by each plant, and to this stick the spindles, as they shoot, are tied. When the flower buds appear, the smallest are taken off, and only a few of the largest are preserved. The buds are frequently apt to burst, which considerably diminishes the beauty of the flower, and therefore the pod is tied slightly round the middle.

**BLOWING of Glass**. See the article **GLASS**.

**BLOWING of tin**, denotes the melting its ore, after being first burnt to destroy the mundick.

**BLUBBER**, the fat of whales, seals, and other sea animals. Train oil is made from this blubber.

**BLUE**, otherwise called **AZURE**, one of the primitive colours of the rays of light. See **COLOUR** and **LIGHT**.

For the different kinds of blue, used by painters, &c. See **ULTRAMARINE**, **PRUSSIAN-BLUE**, &c.

**BLUEING of Metals**, an operation practised greatly by gilders, who always give their metals this colour before they apply the gold or silver leaves. It is done by heating the metal in the fire till it acquires a blue colour.

**BLUE MANTLE**, among heraldists, is the title of one of the pursuivants at arms.

**BLUENESS**, the quality which denotes a body blue.

**BLUNDERBUSS**, a well known fire-arm, consisting of a wide, short barrel, capable of holding a number of small bullets at once.

**BMI**, in musick, the third note in the modern scale. See **GAMUT**.

**BOARD**, a piece of timber from four to a quarter of an inch in thickness, sawn out of a tree, for the purposes of building, and various other purposes.

**BOARD**, in maritime affairs, is used in various senses. Thus "to make aboard," is to make a trip in turning to windward. "To board it up," is to turn to wind-ward. "The weather board," is the windward side of the ship.

**BOARD** is also used for an office under the government: thus we say, the board of trade and plantations, the board of works, ordnance, &c.

**BOARDING a ship**, is entering an enemy's ship in a fight.

In boarding a ship, it is best to bear up directly with her, and to cause all your ports to leeward to be beat open; then bring as many guns from your weather side as you have ports for; and laying the enemy's ship, on board, loof for loof, order your tops and yards to be manned and furnished with necessaries; and let all your small shot be in a readiness; then charge at once with both small and great, and at the same time enter your men under cover of the smoke, either on the bow of your enemy's ship, or bring your midship close up with her quarter, and so enter your men by the shrouds: or if you would use your ordnance, it is best to board your enemy's ship athwart her hawse; for in that case you may use most of your great guns, and she only those of her prow. Let some of your men endeavour to cut down the enemy's yards and tackle, whilst other clear the decks, and beat the enemy from aloft. Then let the scuttles and hatches be broke open with all possible speed to avoid trains, and the danger of being blown up by barrels of powder placed under the decks.

**BOAT** is a small open vessel, conducted on the water by rowing or sailing. The construction, ma-

chinery, and even the names of boats are very different, according to the various purposes for which they are calculated, and the places where they are to be employed. Thus they are occasionally sharp, or flat bottomed; slight, or strong; open or decked; plain, or ornamented, as they may be designed for deep or shallow bottoms; for swiftness or burthen; for taking in a harbour or at sea; and for convenience or pleasure.

**BOATSWAIN**, an officer on board ships of war and large merchantmen, who has the care of all the cables, ropes, sails, blocks, anchors, colours, &c. He also calls out the crew, and takes care that they do their duty &c.

**BOB**, a term used for the ball on the pendulum of a clock.

**BOCARD**, among logicians, the fifth mode of the third figure of syllogisms, in which the middle proposition is an universal affirmative, and the first and last particular negatives, thus:

Bo Some sickly persons are not students;

Ca Every sickly person is pale;

Do Therefore some persons are pale that are not students.

**BOCCONIA**, in botany, a genus of the dodecandria monogynia class. There is only one species, viz. the frutescens, a native of America.

**BODY**, in physics, an extended solid substance, of itself utterly passive and inactive, indifferent either to motion or rest. See **MATTER**, and **MECHANICKS**.

*Colour of BODIES*. See **OPTICKS**.

*Discent of BODIES*. See **MECHANICKS**.

*Division of BODIES*. See **CHYMISTRY**.

**BODY**, with regard to animals, is used in opposition to soul, in which sense it makes the subject of anatomy.

**BODY**, among painters, as to bear a body, a term signifying that the colours are of such a nature, as to be capable of being ground so fine, and mixing with the oil so intirely, as to seem only a very thick oil of the same colour.

**BODY**, in the manage. A horse is chiefly said to have a good body, when he is full in the flank. If the last of the short ribs be at a considerable distance from the haunch bone, although such horses may, for a time, have pretty good bodies, yet, if they are much laboured, they will lose them; and these are properly the horses that have no flank. It is also a general rule, that a man should not buy a light-bodied horse, and one that is fiery, because he will soon destroy himself.

**BODY**, in the art of war, a number of forces, horse, and foot, united and marching under one commander.

*Main BODY of an army*, the troops encamped in the centre between the two wings, and generally infantry: the other two bodies are the vanguard and the rear-guard; these being the three into which an army, ranged in form of battle, is divided.

**BODY**, in matters of literature, denotes much the same with system, being a collection of every thing belonging to a particular science or art, disposed in proper order: thus, we say, a body of divinity, law, physick, &c.

**BOEDROMIA**, in Grecian antiquity, a festival celebrated yearly by the Atheinians in the month boedromion; for the ceremonies of which, See Potter's Arch. Græc. b. ii. c. 20.

**BOEDROMION**, in chronology, the third month of the Athenian year answering to the latter end of our August and the beginning of September.

**BOERHAAVIA**, in botany a genus of the monandria monogynia class. It has no calix; the corolla consists of one bell-shaped plaited petal; and there is but one naked seed. There are six species, all natives of the Indies.

**BOG**, properly signifies a quagmire, covered indeed with grass, but not solid enough to support the weight of the body; in which sense, it differs only from marshes or fens, as a part from the whole: some even restrain the term bog to quagmires pent up between two hills; whereas fens lie in champaign and low countries, where the descent is very small.

To drain boggy lands, a good method is, to make trenches of a sufficient depth to carry off the moisture,



and if these are partly filled up with rough stones, and then covered with thorn bushes and straw to keep the earth from filling up the interstices, a stratum of good earth and turf may be laid over all; the cavities among the stones will give passage to the water, and the turf will grow at top, as if nothing had been done. See the article FEN.

**BOGOMILI**, or **BOGARMITÆ**, in church history, a sect of hereticks, which sprung up about the year 1179. They thought that but seven books of the scripture are to be received, that the use of churches, of the sacrament of the Lord's supper, and all prayer, except the Lord's prayer, ought to be abolished; that the baptism of catholicks is imperfect, that the persons of the Trinity are unequal, and that they oftentimes made themselves visible to those of their sect. They said, that devils dwelt in the churches, and that satan had resided in the temple of Solomon from the destruction of Jerusalem to their own time.

**BOIGUACU**, the largest of all serpents, being from twenty-four to forty feet long, and thick in proportion. It is found in the East and West-Indies, where the Europeans, as well as the natives, are extremely fond of it as food.

The boiguacu is a very terrible animal, lying in ambush in thickets or on branches of trees; from whence it darts itself on its prey. Authors of credit tell us, that it will swallow a goat, a bear, and even a stag, horns and all.

**BOILING**, *Ebullition*, in philosophy, the agitation of a fluid body, arising from the action of fire.

**BOLE**, a genus of earth, moderately heavy, coherent, soft but not viscid, smooth to the touch, and breaking readily between the fingers.

Boles are either white, yellow, red, brown, grey, or green.

I. Of white boles, we have the following species: 1. The pure white bole armenick, esteemed a fudorifick and astringent, but unknown to our shops. 2. A white friable bole, dug near Frankfort, accounted fudorifick and astringent, and accordingly prescribed in spittings of blood, and ulcers of the leg. 3. A hard, heavy white bole, called *terra nocerana*, in great esteem in malignant fevers, and against the bites of venomous animals. 4. The white lemnian earth, a light white bole, esteemed good in dysenteries, hæmorrhages, and malignant fevers. 5. The greyish white bole, called earth of Goltberg, and used as an astringent, cordial, and fudorifick. 6. The yellowish-white bole, or Tuscan earth, prescribed as a fudorifick, and in diarrhoeas. 7. A white, soft, heavy bole, called earth of Malta, prescribed against venomous bites. 8. A whitish alkaline bole, called Eretrian earth, and said to be a noble astringent and fudorifick. 9. A hard, whitish, alkaline bole, found near Bengal, and used with success in fluxes and fevers.

II. Of the yellow boles, these are the species. 1. The yellow bole armenick, said to be an excellent astringent, fudorifick, and alexipharmick. 2. The bole of Blois, of a pure and light yellow colour, and a powerful astringent. 3. The friable, yellow bole of Tokay, esteemed a good astringent. 4. The yellow Lemnian earth, accounted a good fudorifick, astringent, and vulnerary. 5. The friable gold-coloured bole, brought from Westphalia, frequently used in cordial and astringent electuaries. 6. The brownish-yellow bole, called Silesian earth, a good astringent. 7. The light, friable, redish-yellow bole, called Livonian earth, esteemed a better astringent than most of the other boles. 8. The firm and heavy redish-yellow bole, called Bohemian bole, esteemed an excellent medicine in malignant fevers, and fluxes of all kinds.

III. Of the red boles, authors enumerate the following species. 1. A hard red bole, or bole armenick of Avifenna; a good astringent, but never met with genuine. 2. A heavy, compact, pale-red bole, dug in many parts of France. 3. A light, friable, dull-red bole, called earth of Striga. 4. A heavy, friable, red bole, called Livonian earth, and is a powerful astringent. 5. A heavy, friable, pale-red bole, called sealed earth of Tuscany; prescribed in fevers, and fluxes of all

kinds, with good success. 6. A friable, weighty, fine-red bole, found in Portugal, and esteemed a good medicine against poisons, and in malignant fevers. 7. The red Lemnian earth, which is hard and weighty. 8. The friable greyish-red bole, called Turkey earth, used as a fudorifick and astringent. 9. A hard pale-red bole, found in many parts of America.

IV. Of the brown boles, there are only three species. 1. A pure, pale-brown bole, said to be a good astringent. 2. The dense, heavy, pale-brown bole, found in many parts of Germany, and used as a fudorifick and astringent. 3. The light, friable, brown bole, found in many parts of England, thought to be an astringent.

V. Of the green boles, there is only one known species, found in the perpendicular strata of stone in many parts of England, and thought improper to be used internally in medicine, on account of the copper it contains.

**BOLOGNIAN STONE**, a fulphurous kind of stone, found near Bologna in Italy. It is about the size of a walnut, and when properly prepared by calcination, becomes a species of phosphorus. See PHOSPHORUS.

**BOLSTERS**, in maritime affairs, impiles small bags, filled with tarred canvass, and placed between the collars of the stays, and the ledge of wood on which they rest, in order to prevent their being galled or chafed.

**BOLT**, among builders, an iron fastening fixed to doors and windows. They are generally distinguished into three kinds, viz. plate, round, and spring bolts.

Bolts in gunnery are of several sorts; as, 1. Transum bolts, that go between the cheeks of a gun-carriage, to strengthen the transums. 2. Prise-bolts, the large knobs of iron on the cheeks of a carriage, which keep the hand-spike from sliding when it is poizing up the breech of a piece. 3. Traverse-bolts, the two short bolts that being put one in each end of a mortar-carriage, serve to traverse her. 4. Bracket-bolts, the bolts that go through the cheeks of a mortar, and by the help of quoins keep her fixed at the given elevation. And, 5. Bed-bolts, the four bolts that fasten the brackets of a mortar to the bed.

Bolts in a ship are iron pins, of which there are several sorts, according to their different makes and uses. Such are drive-bolts, used to drive out others. Ray-bolts, with jags or barbs on each side, to keep them from flying out of their holes. Clench-bolts, which are clenched with riveting hammers. Forelock-bolts, which have at the end a forelock of iron driven in, to keep them from starting back. Set-bolts, used for forcing the planks, and bringing them close together. Fend or fender-bolts, made with long and thick heads, and struck into the uttermost bends of the ship, to save her sides from bruises. And ring-bolts, used for bringing to of the planks, and those parts whereto are fastened the breeches and tackles of the guns.

**BOLT of canvas**, in commerce, the quantity of twenty-eight ells.

**BOLT-ROPE**, among seamen, implies the rope passing down the sides of a sail, to which it is sewed, and serves to strengthen it.

**BOLTING**, a term formerly used in our inns of court, for the private arguing of cases.

**BOLTING**, among mealmen, signifies the separating the flower from the bran, by means of a bolting-mill.

**BOLUS**, in pharmacy, an extemporaneous form of a medicine, of a consistence somewhat thicker than honey.

**BOLZAS**, a kind of ticking imported from the East Indies.

**BOMB**, in military affairs, a large shell of cast iron, having a great vent to receive the fusee, which is made of wood. The shell being filled with gunpowder, the fusee is driven into the vent or aperture, within an inch of the head, and fastened with a cement made of quick-lime, ashes, brick-dust, and steel filings, worked together in a glutinous water; or of four parts of pitch, two of colophony, one of turpentine, and one of wax. This tube is filled with a combustible matter, made of two ounces of nitre, one of sulphur, and three of



gunpowder dust, well rammed. To preserve the fusee, they pitch it over, but uncase it when they put the bomb into the mortar, and cover it with gunpowder dust; which having taken fire by the flash of the powder in the chamber of the mortar, burns all the time the bomb is in the air; and, the composition in the fusee being spent, it fires the powder in the bomb, which bursts with great force, blowing up whatever is about it. The great height the bomb goes in the air, and the force with which it falls, makes it go deep into the earth.

**BOMBARD**, a piece of ordnance anciently in use, exceedingly short and thick, and with a very large mouth. There have been bombards which have thrown a ball of 300 pound weight. They made use of cranes to load them.

The bombard is by some called basilisk, and by the Dutch, donderbus.

**BOMBARDIER**, a person employed about a mortar. His business is to drive the fusee, fix the shell, load and fire the mortar.

**BOMBARDMENT**, the havock committed in throwing bombs into a town or fortress.

**BOMBARDO**, a musical instrument of the wind kind, much the same as the bassoon, and used as a bass to the hautboy.

**BOMBASINE**, a name given to two sorts of stuffs, the one of silk, and the other crossed, of cotton.

Bombasine of silk pays duty on importation as other foreign silks. See *SILK*. That of cotton pays each piece, not exceeding 15 yards, if narrow, 1l. 3s. 1 $\frac{2}{3}$ d. but if broad, 1l. 6s. 11 $\frac{4}{5}$ d.

**BOMBAST**, in composition, is a serious endeavour, by strained description, to raise a low or familiar subject beyond its rank; which instead of being sublime, never fails to be ridiculous. The mind, in some animating passions, is indeed apt to magnify its objects beyond natural bounds. But such hyperbolical description has its limits, and, when carried beyond these, it degenerates into burlesque, as in the following example:

*Sejanus.*——Great and high

The world knows only two, that's Rome and I.

My roof receives me not; 'tis air I tread,

And at each step I feel my advanc'd head

Knock out a star in heaven.

*Sejan. Ben. Johnson, act 5.*

A writer who has no natural elevation of genius is extremely apt to deviate into bombast: He strains above his genius, and the violent effort he makes carries him generally beyond the bounds of propriety.

**BOMBAX**, or **COTTON-TREE**, in botany, a genus of the monodelphia polyandria class. It has but one stylus; the stigma consists of five lobes; the capsule has five cells; and the seeds are downy. There are three species, viz. the pentandrum, the ceiba, and the heptaphyllum, all natives of the Indies. The cotton-tree grows generally above 60 feet high, and is so thick that the Indians dig canoes which hold several men out of the whole wood. There are hollows in different parts of the trunk which contain large quantities of water, which is of great use to travellers in the hot climates where there is often a scarcity of water. For the method of making cotton, see *COTTON*.

**BOMBAX**, in zoology, a synonyme of a species of *conus*.

It is like-wise applied by Linnaeus to signify such insects as have incumbent wings and feelers resembling a comb.

**BOMB-KETCH**, a small vessel built and strengthened with large beams for the use of mortars at sea.

**BOMBUS**, in medicine, a resounding and ringing noise in the ear.

**BOMBYLIUS**, in natural history, the name of the common humble-bee, of which we have a great variety of species, many of them very beautiful.

**BOND**, a deed by which a person obliges himself to perform some act, such as paying a sum of money, answering for another, &c.

**BOND**, in carpentry, a term among workmen; as, to make good bond, means that they should fasten

two, or more pieces together, either by tenanting, mortising, or dove-tailing, &c.

**BONDAGE**, properly signifies the same with slavery; but, in old law-books, is used for villenage.

**BONDUCH**, **MOLUCCA-NUTS**, the name by which some call a species of acacia, said to be good in herniose tumours, in the colick, and so create an appetite and promote the menses.

**BONDUCK**, in botany, the name used by Plumier, for the guilandina of Linnaeus.

**BONE**, in anatomy, a hard, brittle, insensible part of the body, affording form and support to the whole machine.

The integral or constituent parts of bones, are their periosteum, or investing membrane, their substance, pores, marrow, glands, vessels, &c.

The periosteum can be divided into layers of fibres. The exterior ones, composed of the fibres of the muscles connected to the bones, vary in their number, size, and direction, and consequently occasion a very great difference in the thickness and strength of the periosteum of different bones. The internal layer is every where nearly of a similar structure, and has its fibres in the same direction with those of the bone to which they are contiguous.

The chief uses of the periosteum are: 1. To allow the muscles, when they contract or are stretched, to move and slide easily upon the bones. 2. To keep in due order, and to support the vessels in their passage to the bones. 3. By being firmly braced on the bones, to assist in setting limits to their increase, and to check their overgrowth. 4. To strengthen the conjunction of the bones with their epiphyses, ligaments, and cartilages, which are easily separated in young creatures, when this membrane is taken away. 5. To afford convenient origin and insertion to several muscles which are fixed to this membrane. And, lastly, to warn us when any injury is offered to the parts it covers.

The **BONES** are the most hard and solid parts of the body, and generally of a white colour; only in a living creature they are bluish, which is owing to the blood in the small vessels under their surface.

The substance of the bones is said to consist of lamellæ, or plates lying one upon the other; and consist of small strings, running lengthways of the bones (like as we see in whale-bone) which strings, though some of them run to the very extremities of the bones, and others approach near to them, do not terminate there, so as to have distinct ends; but they are, where they may be thought to terminate, still continued, and run transversely, and as it were, arch-wise; so that the strings of one side of the bone proceed so as to meet and be united to those that are propagated from the opposite: and this at both extremities; being a continuation though not in the figure, yet in the manner of a ring: therefore they are not all of a length, but in every plate they fall one shorter than another.

In several bones, the lamellæ are disposed diversely. In those bones which have a large cavity, they are on every side contiguous, and closely united: but in those which have not any great cavity, but are altogether spongy within, many of the internal laminae are placed at some distance one from another in all their lengths, having between them a cavernous substance, or small bony cells; and so have all those bones, containing a large cavity, some of those cells at both their extremities.

In those bones whose plates are contiguous, there are pores through and between the two plates, besides those which are made for the passage of the blood-vessels; and these are of two sorts, the one penetrate the laminae, and are transverse, looking from the cavity to the external superficies of the bone. The second sort are formed between the plates, which are longitudinal and strait, tending from one end of the bone towards the other, and observing the course of the bony strings.

The first kind are not formed only in the first internal laminae, but in every one, even to the outermost; though the nearer they are to the cavity, the greater is the number of the pores.

The second kind, viz. the longitudinal, are not to be observed



observed but by the help of good glasses; unless it be now and then in some particular bones: by these it is that the medullary oil diffuses itself, and is immediately beneficial to the plates. The other, viz. the transverse, are but subordinate to these, and rather designed for the passage of the marrow into them, than for the immediate communication of it to the substance of the bone.

The medulla contained in the bones, consists (besides the blood-vessels) of an investing membrane, in which are included membranaceous lobules, and bags; and in these bags vesiculæ, or glandulous bladders, very like the vesicular substance of the lungs.

Dr. Havers divides also the blood-vessels of the bones into nutritious and medullary: the most considerable of the nutritious enter at the ends of the bone, viz. the artery at one end, and the veins at the other.

Some bones have long cavities in them, as the os humeri and femoris, the ulna and radius, tibia and fibula, &c. besides these large cavities which are in the inside of the bones, there are less cells or caverns in their substance, which are found in all bones, even those which have a large cavity: besides these, most have superficial cavities, or sinuses, which are distinguished into sulci, or furrows, and the holes for the nutritious and medullary vessels to enter by.

On the surface of the bones are observed two kinds of prominences, one of which is a continued part of the bone jutting apparently above its plain superficies, for the more commodious insertion of the muscles, &c. called apophysis, or processus; the other an additional bone, growing to another by mere continuity, being generally more soft and porous than the other, and called an epiphysis, or appendage.

The bones are connected together various ways, according to the various purposes they are to serve, some being intended for motion, others for rest, and the support of the incumbent parts only.

The number of the bones is various in various subjects; ordinarily is about two hundred and forty-two, some say three hundred, others three hundred and seven, others three hundred and eighteen, but the later writers fix it at two hundred and forty-nine, or two hundred and fifty. See the article SKELETON.

*Accidents to which the BONES are liable*, are either fractures, luxations, or different kinds of wounds. See FRACTURE, LUXATION, and WOUND.

*Diseases of the BONES*, are caries, excrescences, exostoses, fissures, nodes, tophi, rickets, &c.

*Fossile or petrified BONES*, those found buried in different strata, not excepting the hardest rocks, where they have undergone so great a change as to be converted into a stony substance. See the article PETRIFICATION.

BONE-SPAVIN, in farriery, implies a hard swelling on the inside of the hock of a horse's leg.

A spavin, that begins on the lower part of the hock, is not so dangerous as that which puts out higher, between the two round processes of the leg bone; and a spavin near the edge is not so bad as that which is more inward towards the middle, as it does not so much affect the bending of the hock.

A spavin that comes by a kick or blow, is at first no true spavin, but a bruise on the bone, or membrane which covers it; therefore not of that consequence, as when it proceeds from a natural cause; and those that put out on colts, and young horses, are not so bad as those that happen to horses in their full strength and maturity; but in very old horses they are generally incurable.

The usual method of treating this disorder, is by blisters and firing, without any regard to the situation, or cause whence it proceeds. Thus if a fullness on the fore part of the hock comes upon hard riding, or any other violence, which threatens a spavin; in that case such coolers and repellers are proper, as are recommended in strains and bruises. Those happening to colts and young horses are generally superficial, and require only the milder applications; for it is better to wear them down by degrees, than to remove them at once by severe means.

BONIS NON AMOVENDIS, in law, is a writ directed to the sheriffs of London, &c. charging them, that a person against whom judgment is obtained, and

prosecuting a writ of error, be not suffered to remove his goods until the error is determined.

BONITO, a very beautiful sea fish found in the Atlantick ocean between the Tropicks. It is large, and of the tunny kind.

BONNET, in fortification, implies a small work raised beyond the counterscarp, having two faces, which form a salient angle: it is a small ravelin without a trench.

BONNET *à pretre*, or priest's bonnet, in fortification, is an out-work, having three salient and two inward angles at the head.

BONNET, among seamen, implies an addition to a sail, occasionally laced to the bottom.

BONNY, among miners, signifies a bed of ore, neither forming a vein, nor communicating with any one. They are often found on hills and deceive the miners with the expectation of a rich lead vein.

BONZES, Indian priests, of different orders.

BOOBY, a bird of prey, nearly allied to the goose-kind, common about Jamaica.

BOOK, *Liber*, the composition of a man of wit or learning, designed to communicate somewhat he has invented, experienced, or collected, to the publick, and thence to posterity; being withal of competent length to make a volume.

In this sense, a book is distinguished from a pamphlet, by its greater length; and from a tome, or volume, by its containing the whole writing. According to the ancients, a book differed from an epistle, not only in bulk, but in that the latter was folded, and the former rolled up; not but that there are divers ancient books now extant, under the names of epistles.

*Origin of Books.*—We have nothing that is clear on that subject. The books of Moses are doubtless the oldest books now extant; but there were books before those of Moses, since he cites several. Scipio Sgambati, and others, even talk of books before the Deluge, written by the patriarchs Adam, Seth, Enos, Cainan, Enoch, Methuselah, Lamech, Noah and his wife; also by Ham, Japhet and his wife; besides others, by daemons or angels; of all which some moderns have found enough to fill an antediluvian library: but they appear all either the dreams of idle writers, or the impostures of fraudulent ones.

Of profane books, the oldest extant are Homer's poems, which were so even in the time of Sixtus Empiricus; though we find mention in Greek writers of several others, prior to Homer, as Hermes, Orpheus, Daphne, Horus, Linus, Musæus, Palamedes, Zoroaster, &c. but of the greater part of these there is not the least fragment remaining; and of others, the pieces which go under their names are generally held, by the learned, to be supposititious.

*Materials of Books.*—Several sorts of materials were used formerly in making books. Thus we find books were first written on stones, witness the Decalogue given to Moses: then on the parts of plants, as leaves chiefly of the palm-tree; the rind and barks, especially of the tilia, or phillyrea, and the Egyptian papyrus. By degrees wax, then leather, were introduced, especially the skins of goats and sheep, of which at length parchment was prepared: then lead came into use; also linen, silk, horn, and lastly, paper itself.

*Form of Books.*—The first books were in the form of blocks and tables: but as flexible matter came to be wrote on, they found it more convenient to make their books in the form of rolls: these were composed of several sheets, fastened to each other, and rolled upon a stick, or umbilicus; the whole making a kind of column, or cylinder, which was to be managed by the umbilicus as a handle, it being reputed a crime to take hold of the roll itself: the outside of the volume was called *frons*; the ends of the umbilicus, *cornua*, horns, which were usually carved, and adorned with silver, ivory or even gold and precious stones: the title, *συνταξις*, was struck on the outside; the whole volume, when extended, might make a yard and a half wide, and fifty long. The form which obtains among us is the square, composed of separate leaves; which was also known, though little used, by the ancients.



BOOK-BINDING, the art of gathering and fastening together the sheets of a book, and covering it with back : it is performed in the following manner :

The leaves are first folded with a thin piece of ivory, called a folding-stick, and laid over each other in the order of the signatures ; then beaten on a stone with a hammer to make them smooth and open well, and afterwards pressed. They are then sowed upon bands, which are pieces of cord or packthread, six bands to a folio-book, five to a quarto, &c. which is done by drawing a thread through the middle of each sheet, and giving it a turn round each band, beginning with the first, and proceeding to the last.

The books are then to be glued and the bands opened and scraped for the better fixing the paste-boards ; the back is turned with a hammer, and the book fixed in a press between two boards, called backing boards, in order to make a groove for fixing the paste-boards ; which being applied, holes are made for fixing them to the book, which is pressed a third time : then the book is put at last to the cutting press, betwixt two boards, the one lying even with the press, for the knife to run upon ; the other above it, for the knife to cut against ; after which the paste-boards are squared with a pair of shears. The next operation is sprinkling the leaves of the book which is done by dipping a brush made of hog's bristles into vermillion and sap-green, holding the brush in one hand, and spreading the hair with the other ; by which motion the edges of the leaves are sprinkled in a regular manner, without any spots being bigger than the others, at least so far as to be disagreeable to the eye. Then remain the covers, which are either of calf-skin, or sheep-skin.

Anciently books were always bound in parchment, and most of our valuable books, even since the invention of printing, have no other binding : but this practice has been long disused.

The best binding at present is in calf. The calf or sheep-skin, being moistened in water, is cut out to the size of the book with a knife, then smeared over with paste, made of wheat-flour, and afterwards stretched over the paste-board on the out-side ; and doubled over the edges within-side, after having first taken off the four angles, and indented and plaited it at the head-band ; which done, the book is corded or bound firmly between two bands, with a kind of whip-cord, to make the cover stick the stronger to the paste-board and the back, as also to form the bands or nerves more accurately ; then set to dry, and when dry, uncorded, and the leaves at each end opened.

Afterwards, the book is washed over with a little paste and water, and then sprinkled fine with a brush, by striking it either against the hand, or a stick, unless it should be marbled, for then the spots are to be made larger, by mixing the ink with vitriol. Then the cover is glazed twice with the white of an egg beaten, as painters do their pictures when they are finished, and at last polished with a polishing-iron, passed hot over the glazed cover. Thus the binding of a book, properly so called, is finished, unless it should be lettered ; for then a piece of red-Morocco is pasted on the back, between the first and second bands, to receive the title in gold letters, and sometimes a second between the next bands underneath, to receive the number of the volume.

BOOK-KEEPING, in a mercantile sense, the several registers wherein merchants and other dealers keep their accounts.

Merchants books are kept either single, or according to the method of double entry. They who keep them in the former method, have occasion for few books, as a journal, or day-book ; and a ledger, or post-book ; the former to write all the articles, following each other as they occur in the course of their business ; and the other to draw out the accounts of all the debtors and creditors on the journal. This method is only proper for retail dealers, or at least for traders who have but very little business ; but as for wholesale dealers and great merchants, who keep their books according to the double entry, or Italian method, as is now most commonly done, their business requires se-

veral other books, the usefulness of which will be seen from what follows.

The most considerable books, according to the method of double entry, are the waste-book, the journal, and the ledger ; but besides these three, which are absolutely necessary, there are several others, to the number of thirteen, or even more, called subservient or auxiliary books, which are used in proportion to the business a man has, or to the nature of the business a man carries on. These books are the cash-book, the debt-book, the book of numero's, the book of invoices, the book of accounts current, the book of commissions, orders, or advices, &c.

The *Waste-Book* may be defined a register, containing an inventory of a merchant's effects, and debts, with a distinct record of all his transactions and dealings, in a way of trade, related in a plain simple style, and in order of time as they succeed one another.

The waste-book opens with the inventory, which consists of two parts ; first, the effects, that is, the money, a merchant has by him, the goods he has in hand, his part of ships, houses, farms, &c. with the debts due to him ; the second part of the inventory is the debts due by him to others : the difference between which, and the effects, is what the merchant calls neat stock. When a man begins the world, and first sets up to trade, the inventory is to be gathered from a survey of the particulars that make up his real estate ; but ever after is to be collected from the balance of his old books, and carried to the new.

After the inventory is fairly related in the waste-book, the transactions of trade come next to be entered down ; which is a daily task to be performed as they occur. The narrative ought to exhibit transactions with all the circumstances necessary to be known, and no more. It should contain the names of persons with whom the merchant deals upon trust, the conditions of bargain, the terms of payment, the quantity, quality, and prices of goods, with every thing that serves to make the record distinct, and nothing else. The waste-book, if no subsidiary books are kept, should contain a record of all the merchant's transactions and dealings, in a way of trade ; and that not only of such as are properly and purely mercantile, but of every occurrence that affects his stock, so as to impair or increase it, such as private expences, servants fees, house rents, money gained, &c.

The *Journal, or Day-Book*, is the book wherein the transactions recorded in the waste-book are prepared to be carried to the ledger, by having their proper debtors and creditors ascertained and pointed out : whence it may be observed, that the great design of the journal is to prevent errors in the ledger : again, after the ledger is filled up, the journal facilitates the work required in revising and correcting it ; for first the waste-book and journal are compared, and then the journal and ledger ; whereas to revise the ledger immediately from the waste-book would be a matter of no less difficulty than to form it without the help of a journal : lastly, the journal is designed as a fair record of a merchant's business, for neither of the other two books can serve this purpose ; not the ledger by reason of the order that obtains in it, and also on account of its brevity, being little more than a large index : nor can the waste-book answer this design, as it can neither be fair, nor uniform, nor very accurate, being commonly written by different hands, and in time of business. Hence it is, that in case of differences between a merchant and his dealers, the journal is the book commonly called for, and inspected by a civil judge.

In the journal, persons and things are charged debtors to other persons and things as creditors ; and in this it agrees with the ledger, where the same style is used, but differs from it as to forms and order ; so that it agrees with the waste-book in those very things where it differs from the ledger ; and, on the other hand, it agrees with the latter, in the very point wherein it differs from the former : but in order to state the comparison betwixt the waste-book and the journal, we shall turn two or three examples of the waste-book into a journal form.



WASTE-BOOK.

Feb. 25th.			l.	s.	d.
Bought of William Pope, 40 yards of black cloth, at 14s. per yard, payable in three months,			28	00	00
Bought of James Sloan 100 yards of shalloon, at 10d. per yard.	l.	s.	d.		
Whereof paid,	02	00	00		
Rest due, at two months,	02	03	04		
			4	03	04

26th.			l.	s.	d.
Sold William Pope four pipes of port wine, at 27l. 10s. per pipe.	l.	s.	d.		
Whereof received,	55	00	00		
Rest due, on demand,	55	00	00		
			110	00	00

JOURNAL.

Feb. 25th.		l.	s.	d.
BLACK CLOTH Dr. to WILLIAM POPE,				
28 l.				
For 40 yards, at 14s. per yard, pay- }	ble in three months, - }	28	00	00
SHALLOON Dr. to SUNDRIES, 4l. 3s. 4d.				
	l. s. d.			
To Cash paid in part for 100 }	yards, at 10d. per yard, }	2	00	00
To J. Sloan, for the rest, }	due at two months, }	2	03	04
		4	03	04

26th.		l.	s.	d.
SUNDRIES Drs. to PORT WINE, 110 l.				
	l. s. d.			
Cash, received in part for }	four pipes, at 27l. 10s. }	55	00	00
per pipe, - }				
William Pope, for the rest, }	on demand, - }	55	00	00
		110	00	00

It may be here observed, that every case or example of the waste-book, when entered into the journal, is called a journal post, or entrance; thus the examples above, make three direct posts. Again, a post is either simple or complex: a simple post is that which has but one debtor, and one creditor, as the first of these above; a complex post, is either when one debtor is balanced by one or more creditors, as in the second post; or when two or more debtors are balanced by one creditor, as in the third post; or when several debtors are balanced by several creditors; and then the post is said to be complex in both terms. This being premised, the following rules are to be observed for writing in the journal.

1. In a simple post, the debtor is to be expressly mentioned, then the creditor, and lastly the sum, all in one line; after which, the narrative or reason of the entry, in one or more lines, as in the first of these three posts above.
2. In a complex post, the several debtors, or creditors, are expressed in the first line by themselves, with their respective sums subjoined to them, which are to be added up, and their total carried to the money columns, as in the second and third posts.
3. The debtors and creditors should be written in a large letter, or text hand, both for ornament and distinction.

Before we proceed to explain the ledger, we shall previously inquire into the nature and use of the terms debtor and creditor, as the whole art of book-keeping entirely depends on a true idea of those terms, the nature and use of which will be obvious from the following considerations.

Accompts in the ledger consists of two parts, which in their own nature are directly opposed to, and the reverse of one another, which are therefore set fronting one another, and on opposite sides of the same folio. Thus all the articles of the money received, go to the left side of the cash account; and all the articles or sums laid out, are carried to the right. In like manner, the purchase of goods is posted to the left side of the accounts of the said goods, and the sale or disposal of them to the right.

Transactions of trade or cases of the waste-book, are also made up of two parts, which belong to different accounts, and to opposite sides of the ledger, *e. g.* If goods are bought for ready money, the two parts are the goods received and the money delivered; the former of which goes to the left side of the account of the said goods, and the latter to the right side of the cash account.

The two parts in any case in the waste-book, when posted to the journal, are denominated the one the debtor, the other the creditor of that post; and when carried from thence to the ledger, the debtor, or debtor part, is entered upon the left side (hence called the debtor side) of its own account, where it is charged debtor to the creditor part: again, the creditor, or creditor part, is posted to the right side or creditor side of its account, and made creditor by the debtor part. Hence Italian book-keeping is said to be a method of keeping accounts by double entry, because every single case of the waste-book, requires at least two entrances in the ledger, viz. one for the debtor, and another for the creditor.

From what has been said, it is evident that the terms debtor and creditor, are nothing else but marks or characteristics stamped upon the different parts of transactions in the journal, expressing the relation of these parts to one another, and shewing to which side of their respective accounts in the ledger they are to be carried.

Having thus far explained the meaning of the terms debtor and creditor, we shall now proceed to the ledger, or principal book of accounts.

*Of the Ledger.* The ledger is the principal book wherein all the several articles of each particular account, that lie scattered in other books, according to their dates, are collected and placed together in spaces allotted for them, in such a manner, that the opposite parts of every account, are directly set fronting one another, on opposite sides of the same folio.

The ledger's folios are divided into spaces for containing the accounts, on the head of which are written the titles of the accounts, marked Dr. on the left hand page, and Cr. on the right: below which stand the articles, with the word *To* prefixed on the Dr. side, and the word *By* on the Cr. side; and upon the margin are recorded the dates of the articles, in two small columns allotted for that purpose. The money columns are the same as in other books: before them stand the folio column, which contains figures, directing to the folio where the corresponding ledger-entrance of each article is made: for every thing is twice entered in the ledger, viz. on the Dr. side of one account, and again on the Cr. side of some other account; so that the figures mutually refer from the one to the other, and are of use in examining the ledger. Besides these columns, there must be kept in all accounts, where number, measure, weight, or distinction of coins is considerable, inner columns, to insert the quantity; and for the ready finding any account in the ledger, it has an alphabet, or index, wherein are written the titles of all accounts, with the number of the folio where they stand.

*How the Ledger is filled up from the Journal.* 1. Turn to the index and see whether the Dr. of the journal post, to be transported, be written there: if not, insert it under its proper letter, with the number of the folio to which it is to be carried.

2. Having distinguished the Dr. and the Cr. sides, as already directed, recording the dates, complete the entry in one line, by giving a short hint of the nature and terms of the transaction, carrying the sum to the money



money columns, and inserting the quantity, if it be an accompt of goods, &c. in the inner columns, and the referring figure in the folio column.

3. Turn next to the Cr. of the journal-post, and proceed in the same manner with it, both in the index and ledger; with this difference only, that the entry is to be made on the Cr. side, and the word *By* prefixed to it.

4. The post being thus entered in the ledger, return to the journal, and on the margin mark the folios of the accompts, with the folio of the Dr. above, and the folio of the Cr. below, and a small line between them thus  $\frac{2}{4}$ . These marginal numbers of the journal, are a kind of index to the ledger, and are of use in examining the books, and on other occasions.

5. In opening the accounts in the ledger, follow

the order of the journal; that is, beginning with the first journal-post, allow the first space in the ledger for the Dr. of it, the next for the Cr. the third for the Dr. of the following post, if it be not the same with some of those already opened, and so on till the whole journal be transported: and supposing that, through inadvertency, some former space has been allowed too large, you are not to go back to subdivide it, in order to erect another accompt in it.

Though these rules are formed for simple posts, where there is but one Dr. and one Cr. yet they may be easily applied to complex ones.

As examples, how articles are to be entered in the ledger, take the two accompts of CASH an WILLIAM POPE, so far as mentioned in the above waste-book and journal.

1778	CASH	Dr.	Folio	l.	s.	d.	1778	CONTRA	Cr.	Folio	l.	s.	d.
Feb. 26	To port wine, received in part for four pipes, at 27 l. 10s. per pipe,	-	6	55	00	00	Feb. 25	By shalloon, paid in part for 100 yards, at 10d. per yard,	-	12	2	00	00
	WILL. POPE	Dr.						CONTRA	Cr.				
Feb. 26	To port wine, as per journal,	-	6	55	00	00	Feb. 25	By black cloth, for 40 yards, at 14s. per yard,	-	3	28	00	00

Having explained the nature of book-keeping, and given specimens of the Waste-book, Journal and Ledger, I shall proceed to shew the method of transposing accompts from one folio of the ledger to another; how to prove the truth of your posting by a trial balance; the method of examining the book, and correcting the errors; how the real balance is drawn out, and a new set of books opened from it, &c.

The method of transposing accompts from one folio in the ledger to another.

If at any time the space allotted for an accompt should be so filled with articles as to make it necessary to remove it to another folio in the ledger, it may be done by one or other of the following methods, viz.

1st. If it be an accompt, where the difference between the debtor and creditor, with respect to money, is only considered, as is the case in all accompts of persons, cash, profit and loss, &c. add up both sides, and make the new accompt debtor to the old, for the balance or difference, if the debtor side be heaviest; but, if the creditor side be heaviest, make the old accompt debtor to the new.

2dly. If it be an accompt of goods, &c. add up the sides, and make the new account debtor to the old, for the whole quantity and price of the goods bought; and the old accompt debtor to the new, for the total quantity and price of those sold; by which means the old accompt will be balanced, and on the new one will appear both the quantity of goods bought, with the sum paid for them, and those which have been sold, with the money received, as was before on the old account.

How to prove the truth of your posting, by making a trial balance.

The way to make a trial balance is, to add up all the money on the debtor sides, throughout the whole ledger into one sum, and all on the creditor sides into another: if both totals come alike, you may conclude your posting is right; for, as I have already observed, every entry in the ledger is double; that is, no accompt is ever charged debtor, but some other is, or ought to be, credited with the like sum; by which it is plain, there are just as many creditors as there are debtors; and consequently (if the accompts have been properly posted) both sides must exactly agree.

The method of examining the books and correcting errors.

If, upon making the balance above-mentioned, there should be a disagreement in the totals, you may then reasonably conclude (provided no mistake is made in the adding) that you have omitted either the debtor or creditor, or charged them with different sums, or else entered some parcel in both accompts, either on the debtor or creditor side, any of which errors will be discovered by pricking over your ledger; that is, beginning at the first accompt, which is stock debtor to cash, and against the sum make a dot thus (.), then turn to the creditor folio, and mark that in like manner, proceeding thus with every entry throughout the book; and having by this means discovered the mistake, rectify it by one of the following methods, viz.

If the debtor or creditor is omitted, it is corrected by charging which ever of them is in its proper accompt.

If the debtor or creditor be charged with different sums, it is rectified (if either of them be charged too much) by making the opposite side debtor to, or creditor by error, for the excess; if too little, by charging it again debtor to, or creditor by its counterpart for the deficiency.

When a parcel is entered in both accompts on the same side, it is adjusted, by making the opposite side debtor to, or creditor by error, for the sum of the article wrong placed; then enter the article in its proper place, by which means the mistake will be balanced, and the account left properly stated. After this manner are all errors in book-keeping corrected, and not by cancelling or erasing, which merchants never admit of.

How the real balance is drawn out, and a new set of books opened from it.

Balancing the ledger, is adding up the debtor and creditor sides of the several accounts separately; the difference of which being posted on the defective, or lightest side, will make both even; and, consequently, the accompt becomes balanced. In doing which the following rules must be observed.

In the first place, erect in the ledger an account of balance, to which the difference between the debtors and creditors in the accompt of cash, and also in accompts of men, together with the quantity and prime costs of all goods remaining in your hands, must be carried; as for example: let it be supposed, that the debtor side of cash contains 15,000l. and the creditor

10,000l.



10,000l. the difference then being 5000l. (which is the money you have by you) it must be entered on the creditor side, in order to balance the accompt, by making cash creditor by balance 5000l. and consequently balance will stand debtor to cash 5000l. So in the accompts of men, if the debtor be the heaviest, the difference is the money due to you; which, in order to make the accompt even, must be brought on the creditor side; therefore balance will again be charged debtor for the like sum, and *vice versa*. I have already mentioned, that whatever goods remain unfold are carried to balance; but as accounts of goods admit of three varieties, I shall treat of each separately.

The first then is, when none are sold.

In this case, the accompt is made even by being credited by balance, for the whole quantity at prime cost.

The second is, when all are sold.

In which case, the accompt is balanced by profit and loss only, by being charged debtor to, or creditor, by that account for the gain or loss arising from the sale of the goods.

The third is, when only part of the goods are sold.

And here, both the accompts of balance, profit and loss are concerned: for, in the first place, the goods must be credited by balance, for those remaining at prime cost; and afterwards made debtor to, or creditor by profit and loss, for the gain or loss on those that are sold.

The other accompts, such as charges of merchandize, house-expences, &c. as they are disbursements from which no return can be expected, are all balanced by profit and loss, which, together with stock and balance, stand open till the last; and, in order to balance them, begin with profit and loss, and make it debtor to, or creditor by stock for the difference of the sides, which is your whole gain or loss by trade: then add up the accompt of stock, and close it by carrying the difference, which is your neat estate, to balance; by which means the said accompt of balance will become evened; the debtor side of which will present you with a distinct account of all the money, goods, and debts you are possessed of; and the creditor side with an account of whatever is due from to others; and consequently, contains, or rather is, an inventory of your effects, with which a new set of books are opened; for the better understanding of which, compare the balance of the first set with the inventory of the second.

I shall now in the last place examine the methods made use of in keeping company accompts.

There is no part of book-keeping that admits of greater variety, or is so extensively useful, as that which is called company accompts, there being few merchants who have any considerable dealings, but what are concerned in partnership; notwithstanding which, it has been treated of by the majority of writers upon this subject, in the most superficial manner, and they are still divided in the method of journalizing those cases relating to goods in company being sold upon trust: some chusing to make the buyer debtor to the goods in company and then the partner's accompt company debtor to his accompt current, for his half share of the money due; by which method, it is evident, your partner's accompt current (which is what should particularly shew the money due, either from, or to the person) becomes credited for a sum you, at present, do not owe him, by reason of your not having received it; and if never paid, are not accountable for. There is also another obvious objection, which naturally arises to this method: and that is, when goods are paid for at different times, in order to know what money is due to your partner, recourse must be had to the purchaser's accompt; and if sold, for part money, part time, both the goods in company, and purchaser's accompt, must be referred to, as it is impossible, amidst a multiplicity of business, to charge the memory with things of this nature, neither would it be proper so to do.

By the other method made use of, all the above objections are removed; for as here no notice is taken of money due to your partner, 'till such time

as it is received, the accompt company will remain open; and, as the payments are made, be charged debtor to the current of your partner's share of the sum, by which means he will be credited for his part of whatever money has been received; and consequently, his accompt current with plainly shew what he has a right to demand of you. If any object, that, when the goods are sold, the accompt company, as it shews your partner's share in them, ought to be closed; I answer: the goods in company is the proper accompt to have recourse to for their disposal, that the accompt company then answers the purpose of an accompt at time, and may be balanced in the same manner, as it shews what money is due at time to your partner.

*Cash Book.* This is the most important of the auxiliary books. It is so called, because it contains, in debtor and creditor, all the cash that comes in, and goes out of a merchant's stock. The receipts on the debtor's side; the persons of whom it was received, on what, and on whose account, and in what specie: and the payments, on the creditor's side; mentioning also the specie, the reasons of the payments, to whom, and for what account they are made.

*Book of debts, or payments,* is a book in which is written down the day on which all sums become due, either to be received or paid, by bills of exchange, notes of hand, merchandizes bought or sold, or otherwise. By comparing receipts and payments, one may, in time, provide the necessary funds for payments, by getting the bills, notes, &c. due to be paid, or by taking other precautions.

*Book of numero's, or wares.* This book is kept in order, to know easily all the merchandizes that are lodged in the ware-house, those that are taken out of it, and those that remain therein.

*Book of invoices.* This book is kept to preserve the journal from erasures, which are unavoidable in drawing up the accounts of invoices of the several merchandizes received, sent out, or sold; wherein one is obliged to enter very minute particulars. It is also designed to render those invoices easier to find than they can be in the waste-book-book, or journal.

*Book of accounts current.* This book serves to draw up the accounts which are to be sent to correspondents, in order to settle them in concert, before they are balanced in the ledger; it is properly a duplicate of the accounts current, which is kept to have recourse to occasionally. The other mercantile books generally in use are, the book of commissions, orders, or advices; the book of acceptances of bills of exchange; the book of remittances; the book of expences; the copy book of letters; the book of postage; the ship-books, and the book of work-men. To these may be added others, which depend on the greater or lesser accuracy of the merchants and bankers, and on the several kinds of trade carried on by particular dealers.

*BOOKING,* among merchants, the making an entry of any thing in a journal. See the articles *Book* and *JOURNAL*.

*BOOK-SELLER,* one who trades in books.

*BOOM,* in the sea-language, a long piece of timber with which the clew of the studding-sail is spread out; and sometimes the boom is used to spread or boom out the clew of the mainmast.

Boom-spars, imported from the British plantations, are free of duty; if from Ireland, Asia, or Africa, they pay 6s. 5d. the hundred; and if from elsewhere, 9s. 6d.  $\frac{1}{2}$ .

*BOOM,* denotes also a cable stretched athwart the mouth of a river or harbour; with yards, top-masts, battling or spars of wood lashed to it, to prevent an enemy's coming in.

*BOOMING,* among sailors, denotes the application of a boom to the sails.

A ship is said to come booming forwards, when she comes with all the sail she can make.

*BOOT,* a well known cover for the leg, made of leather.

Hunting boots are made of thinner leather than ordinary, as the fishing ones are of a strong thick kind, fit to keep out water.



**Jack-Boots**, a very strong kind, worn by troopers.  
**BOOT-TREE**, among shoe-makers, implies a last, or instrument for stretching the leg of a boot.

**BOOTES**, a constellation of the northern hemisphere, consisting of 23 stars, according to Ptolemy's catalogue, of 28 in Tycho's, of 34 in Bayer's, of 52 in Helvelius's, and of 54 in Mr. Flamsteed's catalogue.

Bootes by some is called the Waggoner, because he is supposed to drive Charles's-wain, which is drawn by three oxen. Others call him Artophilax, and suppose him to be the keeper of the bear, or that the care of the bear is committed to him.

**BOOTY**, whatever is taken from an enemy in the time of war; spoil, plunder.

**BORAGO**, in botany. See **BORRAGE**.

**BORASSUS**, in botany, a genus belonging to the order of palmæ flabellifoliæ. The borassus, of which there is but one species, has palmated and plaited leaves, and is a native of India.

**BORAX**, the name of a saline substance brought from the E. Indies in large masses, composed partly of large crystals, but chiefly of smaller ones, partly white and partly green, joined together, as it were, by a greasy yellow substance, intermingled with sand, small stones, and other impurities. The purer crystals, exposed to the fire, melt into a kind of glass, which is nevertheless soluble in water.

This salt, dissolved and crystalized, forms small transparent masses. The origin of this salt is not known; but experiments have clearly shewn, that it consists of a fixt alkaline salt, the same with the basis of sea-salt, in some degree neutralised by another saline substance, which is supposed to exist no where but in borax itself.

The medical virtues of borax are little known: In doses of half a dram to two scruples, it is supposed to be diuretick, emmenagogue, and a promoter of delivery.

**BORBONIA**, in botany, a genus of the diadelphia decandria class. The calix is pointed and prickly; and the stigma is emarginated. There are six species of borbonia, which is a kind of broom, all natives of America.

**BORBORITES**, in church-history, a sect of Gnosticks, in the second century, who, besides, embracing the errors of these hereticks, denied the last judgment.

**BORDAT**, in commerce, a small narrow stuff which is manufactured in some parts of Egypt, particularly at Cairo, at Alexandria, and at Damietta.

**BORDER**, in gardening, is made to inclose parterres, that they may not be injured by walking in them.

Borders are made either circular, strait, or in cants; and are turned into knots, scrolls, volutes, and other compartments. They are rendered very ornamental by the flowers, shrubs, yews, &c. that are raised in them. They are always laid with a sharp rising in the middle; because, if they are flat, they are no ways agreeable to the eye: And as for their breadth, the largest are allowed five or six feet, and the lesser commonly four. There are four sorts, 1. Those continued about parterres, without any interruption. 2. Those cut into compartments and convenient distances by small passages; these two are raised in the middle, and adorned with flowers and shrubs. 3. Even and flat ones, without flowers. And, 4. Quite plain borders. Only fanded, as in parterres of orangery.

**BORD-halfpenny**, a small toll, by custom paid to the lord of the town for setting up boards, tables, booths, &c. in fairs and markets.

**BORD-lands**, the demesnes which lords keep in their hands for the maintenance of their board or table.

**BORD-lofe**, a service required of tenants to carry timber out of the woods of the lord to his house. It is also used to signify the quantity of provision which the bordarii or bordmen paid for their bord lands.

**BORD-service**, the tenure of bord-lands, by which some lands in certain places are held of the bishop of London, and the tenants now pay sixpence *per* acre, in lieu of finding provision anciently for their lord's table.

**BORDURE**, in heraldry, a cutting off from within the escutcheon all round it about  $\frac{1}{3}$  of the field, serving

as a difference in a coat of arms, to distinguish families of the same name, or persons bearing the same coat.

If the line constituting the bordure be strait, and the bordure be plain, then in blazoning you must only name the colour of the bordure.

Bordures are sometimes ingrailed, gobonated, invicted, &c.

If the border be charged with any part of plants or flowers, the term is verdoy of trefoils, or whatever flower it be. If it consists of ermins, vairy, or any of the furs, they say purflew of ermins, &c. If the bordure be charged with martlets, the word is charged with an enalyron of martlets, &c.

Bordures are symbols of protection, favour and reward; and as such kings bestow them on those they have a value for.

**BORE**, among engineers, denotes the diameter of the barrel of a gun or canon, or rather its whole cavity.

**Square BORE**, among mechanicks, a square piece of well-tempered steel, fitted into a handle, serving to widen holes, and make them perfectly round.

**BOREAL**, in a general sense, something relating to the north. Thus,

**BOREAL signs**, in astronomy, are the first six signs of the zodiack, or those northwards of the equinoctial.

**BOREAS**, a Greek name, now in common use for the north wind.

Pezron observes, that anciently boreas signified the north-east wind, blowing at the time of the summer solstice. Boreas is represented in painting like an old man with a horrible look, his hair and beard covered with snow or hoar frost, with the feet and tail of a serpent.

**BORING**, in a general sense imports the perforating or making a hole through any solid body.

**BORING of Water Pipes**. See **PIPE**.

**BORING**, in mineralogy, implies a method of searching the earth, by means of scooping irons, something in the form of a common augre, which bring up samples of the different strata through which the borers pass.

**BORING**, among farriers, implies a very absurd and cruel treatment, still practised by the most ignorant of the profession, for curing a wrenched shoulder, but which has long since been exploded by every writer of credit on the diseases of horses.

**BOROUGH, BURROUGH, BOROW, or BURCH**, a corporation, or town, which is not a city. The word, in its original signification, meant a company, consisting of ten families, which were bound together as each other's pledge. Afterwards borough came to signify a town, having a wall or some kind of enclosure round it. And all places that in old time had the name of borough, it is said, were fortified, or fenced in some shape or other. Borough is a place of safety and privilege: and some are called free boroughs, and the tradesmen in them free burgeses from a freedom they had granted to them originally, to buy and sell without disturbance, and exempt from toll.

**BORRAGE**, *borago*, in botany, a genus of the *pentandria-monogynia* class of plants, the flower of which consists of a single petal of the length of the cup, and divided into five segments: there is no pericarpium, but the cup grows larger and inflated, and contains four seeds of a roundish figure, rugose, carinated outwardly from the point, globose at the base, and inserted into a hollow receptacle. The leaves of borrage are accounted cordial, and good in removing faintness; for which reason the tops are frequently put into wine and cool tankards. Boerhaave recommends the expressed juice in all inflammatory diseases. The flowers are one of the four cordial flowers. The only official preparation is the conserve of the flowers.

**BORRELLISTS**, in ecclesiastical history, a branch of the Anabaptists, who reject the use of churches, sacraments, and all external acts of devotion.

**BOS**, the Ox. See the article **Ox**.

**BOSCAGE**, in a law sense, is that food which trees yield to cattle, as mast, &c. But Manwood says, to be quit of boscage, is to be discharged of paying any duty







*Journefort's System of Botany*  
Classes



*The Linnæan System of Botany*  
Classes





duty for wind-fall wood in the forest. Among painters, denotes a landscape representing much wood and trees.

**BOSQUETS**, in gardening, groves so called from *boschetto*, an Italian word, which signifies a little wood.

They are compartments in gardens, formed by the branches of trees, disposed either regularly in rows, or wildly and irregularly, according to the fancy of the owner.

**BOSSAGE**, in architecture, signifies rustick work, or any stone that projects beyond another.

**BOSTANGIS**, a name given by the Turks to persons employed in the gardens of the seraglio.

**BOTANIST**, a person acquainted with the science of botany.

**BOTANY**, the science of plants, their several kinds, their forms, virtues, and uses.

The word is Greek, *βοτανή*, an herb, which is derived from *βωω*, to feed; because most animals feed on vegetables.

The most eminent botanists among the ancients were Hippocrates, Theophrastus, Dioscorides, Pliny, Galen, &c. In the sixteenth century, the ancient botany, which had been lost for ages, was industriously revived by Leonicens, Brasavolus, Cordus, Fuchsius, Matthiolus, Dalechampius, &c. These were soon after joined by others, and by their industry the art was first reduced into a body or system; as Gesner, Dodonæus, Cæsalpinus, Clusius, Lobel, Columna, Prosper Alpinus, the two Bauhins, Plunket, Bucconi, &c. These were succeeded by others, who have laboured successfully to bring the science of botany still nearer to perfection. Among these are Morrifon, Malpighi, Hermannus, Ray, Magnol, Tournefort, Sloan, Sherrard, Boerhaave, Linnæus, and many others.

The science of botany is differently explained by different authors; but the two systems of Tournefort and Linnæus more especially deserve our consideration: we shall begin with the former.

According to Tournefort, all plants are ranged under one or other of the following classes, viz. 1. Plants with monopetalous, campaniform, or bell-fashioned flowers. 2. Those with monopetalous, infundibuliform, or funnel-like flowers. 3. Plants with anomalous monopetalous flowers. 4. Plants with polypetalous labiated flowers. 5. Plants with polypetalous cruciform flowers. 6. Plants with polypetalous rosaceous flowers. 7. Plants with polypetalous, rosaceous, and umbellated flowers. 8. Plants with caryophylleous or pink-like flowers. 9. Plants with liliaceous or lily-like flowers. 10. Plants with polypetalous papilionaceous flowers. 11. Plants with polypetalous anomalous flowers. 12. Plants with flosculous flowers. 13. Plants with semiflosculous flowers. 14. Plants with radiated flowers. 15. Plants with stamincous flowers. 16. Plants without flowers, but having visible feeds. 17. Plants with neither visible flowers nor feeds. 18. Trees with apetalous flowers. 19. Trees with apetalous amentaceous flowers. 20. Trees with monopetalous flowers. 21. Trees with rosaceous flowers. 22. Trees with papilionaceous flowers: the description of each of which see under their several numbers, plate XX. *Tournefort's Classes.*

Linnæus has established an entirely new system of botany, founded on the number and different structure observable in the male and female parts of generation of each plant; the former of which is called stamen, or stamina, when there are more than one of them; and the latter pistil. See the articles **STAMINA** and **PISTIL**.

From the number and situation of the stamina, he has arranged the whole family of plants under twenty-four classes, viz. 1. The monandria. 2. Diandria. 3. Triandria. 4. Tetrandria. 5. Pentandria. 6. Hexandria. 7. Heptandria. 8. Octandria. 9. Enneandria. 10. Decandria. 11. Dodecandria. 12. Icosandria. 13. Polyandria. 14. Didynamia. 15. Tetradynamia. 16. Monadelphia. 17. Diadelphia. 18. Polyadelphia. 19. Syngenesia. 20. Gynandria. 21. Monoecia. 22. Dioecia. 23. Polygamia. 24. Cryptogamia. See the description under their several numbers, plate XX. *Linnæus's Classes.*

These are the general classes of plants established by  
VOL. I. No. 13.

that excellent botanist; who further subdivides them into orders, which he denominates monogynia, digynia, trigynia, &c. from the number of pistils, or female parts of generation, found in each plant.

The same celebrated naturalist has likewise distributed the vegetable part of the creation into different orders, from the form and structure of the calyx, or cup, of their flowers: but as this has no connection with the method laid down, we must refer the reader to his *Genera Plantarum*, where they will find it explained, as also to the article **CALYX**.

**BOTARGO**, a kind of sausage, made with the eggs and blood of the sea-mullet, a large fish, common in the Mediterranean. The best kind comes from Tunis, in Barbary: it must be chosen dry and reddish. The people of Provence use a great deal of it, the common way of eating it being with olive oil and lemon juice. There is also a great consumption of botargo throughout all the Levant.

Botargo pays on importation  $2\frac{8}{100}$  d. the pound; whereof  $2\frac{5}{100}$  d. is repaid on exportation.

**BOTATRISSA**, or **BOTATRIA**, in ichthyology, a species of bearded gadus, with only two fins on the back, and both the jaws equal.

**BOTAURUS**, in ornithology, the same with the bittern. See **BITTERN**.

**BOTE**, *bota*, in our old law books, signifies recompence or amends: thus man-bote, is a compensation for a man slain.

There are likewise house-bote and plough-bote, privileges to tenants, of cutting wood for making ploughs, repairing tenements, and likewise for feul.

**BOTELESS**, or **BOOTLESS**, is when an offender was said to be without emendation, when no favour can acquit him; as in the case of sacrilege.

**BOTRYTIS**, in botany, the same with the *Byssus* of Linnæus.

**BOTTLE**, a vessel proper to contain liquors, made of leather, glass, or stone.

**BOTTOM**, in a general sense, implies the lowest part of a thing, in contradistinction to the top, or upper part.

**BOTTOM**, in navigation, implies either the bed of a channel, river, harbour, &c. and the body, or hull of a ship.

**BOTTOMRY**, in commerce, implies a marine contract, for borrowing money, by pledging the bottom of the ship, for the payment at the end of the voyage.

**BOTTOMRY** also implies money lent to a merchant, on the credit of a ship, and for which the lender is to receive a larger interest than common, because the money is lent at the hazard of the lender; it not being recoverable from the merchant if the ship be lost.

It is enacted by 19 Geo. II. cap. xxxvii. that after August 1, 1746, every sum of money lent on bottomry, upon the ships of any subjects to or from the East-Indies, shall be lent only on the ship, or the merchandizes laden on board her, and so expressed in the condition of the bond; and the benefit of salvage shall be granted to the lender, his agents, &c. who only shall have a right to make assurance on the money lent: and no borrower of money on bottomry shall recover more on any assurance, than the value of his interest on the ship or effects, exclusive of the money borrowed. And if the value of his interest doth not amount to the money borrowed, he shall be responsible to the lender for the surplus, with lawful interest for the same, together with the assurance, and all charges whatsoever, &c. notwithstanding the ship and merchandize shall be totally lost. There is a fictitious way of taking up money, in the nature of bottomry, upon supposition of a ship and master, when, indeed, there is no such ship or master in being; the condition reciting, if that ship (naming her) shall not arrive at such a place, within twelve months, the money agreed on to be paid, shall be paid; but if the ship shall arrive, then nothing is to be paid. This unjustifiable method of raising money is a common practice among the Italians; and, it is to be feared, has been too frequently used by some persons on this side the water.

**BOTTOMY**. A cross bottomy, in heraldry, terminates  
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nates at each end in three buds, knots, or buttons, resembling, in some measure, the three-leaved grass; on which account Segoing, in his *Treſor Heraldique*, terms it *croix treſſee*. It is the badge of the order of St. Maurice.

**BOTTS**, a name given to species of worms infesting horses and other cattle.

The botts which breed in the stomach of horses, and which are sometimes the cause of convulsions, appear to be very large maggots, composed of circular rings, with little sharp prickly feet along the sides of their bellies (like the feet of hog-lice) which, by their sharpness, equal to that of the finest needle, seem to be of use to fasten them to the part where they breed, and from whence they draw their nourishment, and also to prevent their being loosened from such adhesion, before they come to maturity. The eggs from whence these botts are produced, are disposed in clusters round the lower orifice of the stomach, and are laid under the inner coat, or thin membrane of the stomach; so that when the animals come to life, they burst through the inner coat, their breech and tail straight outwards, and their trunks so fixed into the muscular or fleshy coat of the stomach, that it sometimes requires a good pull to disengage them: from the blood of this last coat they draw their nourishment, which they suck like so many leeches, every one ulcerating and purging up the part where it fixes, like a honey-comb; and they often make such quick havock as to destroy the horse.

The botts which many horses are troubled with in the beginning of summer, are always seen sticking to the strait gut, and are often thrust out with the dung, together with a yellowish coloured matter resembling melted sulphur; they are no ways dangerous there, but are apt to make a horse restless and uneasy, and rub his breech against the posts. The season of their coming is in the months of May and June, after which they are seldom to be seen, and rarely continue in any one horse above a fortnight or three weeks. And the creature may be easily cured when they are only in the strait gut, by giving him a spoonful of favin cut very small, once or twice a day in his oats or bran, moistened: three or four cloves of garlick may also be added to advantage. The following purge should likewise be given:

Take fine succotrine aloes ten drams; fresh jallap one dram; birthwort and myrrh powdered, of each two drams; oil of favin and amber, of each one dram; syrup of buckthorn enough to form the whole into a ball.

But the botts, which take their lodgment in the stomach, are, as has been already observed, extremely dangerous, by causing convulsions, and are seldom discovered by any previous signs before they come to life, when they throw the horse into violent agonies. The only cure for these is mercurial medicines; the following will answer the intention;

Take quicksilver two drams; Venice turpentine half an ounce; rub the quicksilver till no glistening appears; then take an ounce of aloes, a dram of grated ginger, thirty drops of oil of favin, and syrup of buckthorn enough to make the whole into a ball.

One of these balls may be given every six days, with the usual precautions with regard to mercurial physick: and the following powders immediately:

Take powdered tin and Æthiops mineral, of each an ounce; and give it every night in a mash, or in his corn.

These medicines, or any of the various preparations of antimony and mercury, should be continued several weeks together, in order to free the animal entirely from these vermin. *Bartlett's Farriery*, pag. 150.

**BOULDER-WALL**, among masons, implies a wall composed of flints or pebbles laid in strong mortar, and used to defend the adjacent lands from the breaking of the sea.

**BOULTINE**, among builders, a convex moulding, of which the convexity is exactly one fourth part of a circle. It is one of the members in the Doric and Tuscan orders, and placed just below the plinth.

**BOUNTY**, in commerce, implies a premium, a sum of money paid by the government to the exporters of certain commodities.

**BOURIGNONISTS**, the name of a sect among the

Protestants of the Low-Countries, who conduct themselves by pretended revelations, and whose principles nearly resemble those of the quietists, and modern perfectionists.

**BOUTS-RIMEZ**, in French poetry, imply a certain number of rhymes disposed in order, and given to a poet, together with a subject, for him to fill up with verses, ending with the same words and order.

**BOW**, a weapon of offence made of steel, wood, horn, or other elastic substances, which, after being bent by means of a string fastened to its two ends, in returning to its natural state, throws out an arrow with prodigious force.

The use of the bow is, without all doubt, of the earliest antiquity. It has likewise been the most universal of all weapons, having obtained amongst the most barbarous and remote people, who had the least communication with the rest of mankind.

Bow, the name of a mathematical instrument, formerly used for taking the sun's altitude at sea.

*Bow of a Ship*, implies the round part of a ship's side near the stem; reaching from the part where the planks begin to bend to the stem.

Bow, among architects, signifies a beam of wood or brass, through which pass three long screws, directing a lath of wood or steel to any arch required.

Bow, among mechanicks, implies an instrument used by watchmakers, gunsmiths, &c. for turning their work.

**BOWL**, denotes either a ball of wood, for the use of bowling; or a vessel of capacity, wherein to hold liquors.

Bowls and buckets of wood, imported, pay a duty of 9  $\frac{5}{100}$  d. the dozen; whereof 8  $\frac{6}{100}$  d. is repaid on exporting them.

**BOWLING**, or **Bow-LINE**, among seamen, signifies a small line fastened to the leeches of square sails, in order to draw the weather edge of the sail further forward, by which means the ship will be nearer to the wind.

**BOWLING-BRIDLE**, the small ropes by which the bow-lines are fastened to the leeches of the sail.

**BOWLING-GREEN**, a kind of parterre laid with fine turf, and designed for the exercise of bowling.

**BOWSING**, among seamen, implies the same with haling or pulling.

**BOW-SPRIT**, in a ship, a kind of mast fixed in an oblique position, projecting over the stern, and its heel fastened to the partners of the mainmast.

**BOWYERS**, artificers whose employment or occupation it is to make bows. This company of bowyers in the city of London, was first incorporated in 1622, and consists of a master, two wardens, twelve assistants, and thirty-two on the livery. *New View of London*.

**BOX**, *Buxus*, the name of a well-known tree, of which botanists enumerate seven species, viz. 1. The box-tree. 2. The narrow-leaved box-tree. 3. The striped box. 4. The gold-edged box-tree. 5. The dwarf box. 6. The dwarf striped box. 7. The silver-edged box.

The first and second sorts grow in great plenty upon Box-hill near Darking in Surry, where were formerly large trees of these kinds: but of late they have been pretty much destroyed; yet there are great numbers of these trees remaining, which are of a considerable bigness. The wood of this tree is very useful for turners, engravers, and mathematical instrument makers; the wood being so hard, close, and ponderous, as to sink in water; which renders it very valuable for divers utensils.

*Box of a Wheel*, the aperture in which the axis turns.

*Box of a Plough*, the cross-piece in the head of a plough, supporting the two slaves.

**BOXING**, in navigation, an operation in sailing, often used to throw a ship's head into the line of direction, when she has inclined to windward of it. The operation consists in laying the head sails a-back.

**BOYAU**, in fortification, a ditch covered with a parapet, which serves as a communication between two trenches. It runs parallel to the works of the body of the



the place, and serves as a line of contravallation, not only to hinder the sallies of the besieged, but also to secure the miners. But when it is a particular cut that runs from the trenches to cover some spot of ground, it is drawn so as not to be enfiladed, or scoured by the shot from the town.

BOYER, a small vessel of burden, resembling a smack, with only one mast and a bolt-sprit.

BOYES, idolatrous priests among the savages of Florida.

Every priest attends a particular idol, and the natives address themselves to the priest of that idol, to which they intend to pay their devotion.

The idol is invoked in hymns, and his usual offering is the smoke of tobacco.

BOYLE'S LECTURES, a course of sermons set on foot, in London, by the honourable Robert Boyle in 1691; the design of which is to prove the truth of the Christian religion against infidels, without descending to any controversies among Christians.

BRABEJUM, in botany, a genus of the *tetrandriamono-gynia* class of plants, the flower of which consists of four linear obtuse petals in the lower part erect, and forming a kind of tube; in the upper turned backward. The fruit is a drupe of the drier kind, of an oval figure and hairy: the kernel is oval. This plant is a native of the country about the Cape of Good-Hope; and in this climate must be sheltered in a greenhouse in winter.

BRACE, in the common acceptation, signifies a pair or couple of any thing, as hares, partridges, pheasants, &c.

BRACE, among carpenters, signifies a piece of timber formed with bevil joints, to keep the building, &c. from swagging, or swerving either way.

BRACES, in the sea-language, are ropes belonging to all the yards of a ship, except the mizen, two to each yard, received through blocks that are fastened to pendants seized to the yard-arms. Their use is either to square, or traverse the yards. Hence to brace the yard, is to bring it to either side. All braces come towards the stern as the main-brace comes to the poop, the main-top-fail brace comes to the mizen-top, and thence to the main shrouds: the fore and fore-top-fail braces come down by the main and main-top-stays, and so of the rest. But the mizen bowline serves to brace to the yard, and the cross-jack braces are brought forwards to the main-shrouds, when the ship sails close by the wind.

BRACHIÆUS, in anatomy, a name given to two muscles, which are the flexors of the cubits, and distinguished by the appellations of externus and internus. See the article *MUSCLES of the human body*.

BRACHMANS, a sect of Indian philosophers. The ancient Brachmans lived upon herbs and pulse, and abstained from every thing that had life in it. They lived in solitude without matrimony, and without property; and they wished ardently for death, considering life only as a burden. The modern Brachmans make up one of the casts or tribes of the Banians. They are the priests of that people, and perform their office of praying and reading the law, with several mimical gestures, and a kind of wavering voice. They admit of rewards and punishments after this life; and have so great a veneration for cows, that they look on themselves as blessed if they can but die with the tail of one of them in their hand. They have preserved some noble fragments of the knowledge of the ancient Brachmans. They are skilled arithmeticians, and calculate, with great exactness, eclipses of the sun and moon. They are remarkable for their religious austerities. One of them has been known to make a vow to wear about his neck a heavy collar of iron for a considerable time: another, to chain himself by the foot to a tree, with a firm resolution to die in that place; and another to walk in wooden shoes stuck full of nails on the inside.

BRACHYGRAPHY, the art of short-hand writing.

BRACKET, among carpenters, implies a kind of wooden stay, serving to support shelves and the like.

BRACKETS, in ship-building, are the short crook-

ed timbers, fixed under the frame of a ship's-head, to support the gratings.

BRACKETS, in gunnery, imply the cheeks of the carriage of a mortar.

BRACTEA, in natural history, implies a spangle, scale, or thin flake of any substance. In botany, it signifies the floral leaf.

BRADS, among carpenters, joiners, &c. implies a kind of nails without heads, and of which there are several sorts.

BRAGGET, a kind of drink made of malt, honey, and spices, much used in Wales.

BRAIL, or BRAILS, in a ship, are small ropes, made use of to furl the sails across: they belong only to the two courses and the mizzen-sail; they are reeved through the blocks, seized on each side the ties, and come down before the sail, being at the very skirt thereof fastened to the cringles; their use is, when the sail is furled across, to hale up its bunt, that it may the more easily be taken up or let fall. Hale up the brails, or brail up the sail, that is, hale up the sail, in order to be furled or bound close to the yard.

BRAIN, in anatomy, a name given to all that mass which fills the cavity of the cranium, and which is immediately surrounded by two membranes, called meninges by the Greeks, and matres by other ancients, because they were commonly of opinion that these membranes were the origin, and, as it were, the mother of all the other membranes of the body.

This general mass is divided into three particular portions; the cerebrum, or brain, properly so called; the cerebellum, and medulla oblongata. To these three parts contained within the cranium, a fourth is added, which fills the great canal of the spina dorsa by the name of medulla spinalis, being a continuation of the medulla oblongata.

The meninges, or membranes, are two in number, one of which is very strong, and lies contiguous to the cranium; the other is very thin, and immediately touches the brain. The first is named dura mater; the second pia mater, which is again divided into two, the external lamina being termed arachnoides, and the internal retaining the common name of pia mater. See the articles *DURA MATER*, and *PIA MATER*.

The cerebrum, properly so called, is a kind of medullary mass, of a moderate consistence, and of a greyish colour on the outer surface, filling all the superior portion of the cavity of the cranium, or that portion which lies above the transverse septum. The upper part of the cerebrum is of an oval figure, like half an egg cut lengthwise, or rather like two quarters of an egg cut lengthwise, and parted a little from each other. It is flatter on the lower part, each lateral half of which is divided into three eminences, called lobes, one anterior, one middle, and one posterior.

The substance of the cerebrum is of two kinds, distinguished by two different colours; one part of it, which is the softer, being of a greyish or ash-colour; the other, which is more solid, very white. The ash-coloured substance lies chiefly on the outer-part of the cerebrum, like a kind of cortex; from whence it has been named substantia corticalis or cinerea. The white substance occupies the inner part, and is named substantia medullaris, or simply substantia alba.

The cerebrum is divided into two lateral portions, separated by the falx, or great longitudinal septum of the dura mater. They are generally termed hemispheres; but they are more like quarters of an oblong spheroid. Each of these portions is divided into two extremities, one anterior, and one posterior, which are termed the lobes of the cerebrum, between which there is a large inferior protuberance which goes by the same name; so that in each hemisphere there are three lobes, one anterior, one middle, and one posterior.

The anterior lobes lie upon those parts of the os frontis which contribute to the formation of the orbits and of the frontal sinuses, commonly called the anterior fossæ of the basis cranii. The posterior lobes lie on the transverse septum; and the middle lobes, in the middle or lateral fossæ of the basis cranii.

Each lateral portion of the cerebrum, has three sides, one



one superior, which is convex; one inferior, which is uneven; and one lateral, which is flat; and turned to the falx. Through the whole surface of these three sides we see inequalities or windings like the circumvolutions of the intestines, formed by waving streaks or furrows very deep and narrow, into which the septa, or duplicatures of the pia mater, insinuate themselves, and thereby separate these circumvolutions from each other.

Near the surface of the cerebrum, these circumvolutions are at some distance from each other, representing serpentine ridges; and in the interstices between them, the superficial veins of the cerebrum are lodged, between the two laminae of the pia mater, by an infinite number of very fine vascular filaments, as may be seen by pulling the circumvolutions a little asunder with the fingers.

When they are cut transversely, we observe that the substantia alba lies in the middle of each circumvolution; so that there is the same number of internal medullary circumvolutions as of external cortical ones; the first representing white laminae invested by others of an ash-colour; but the cortical substance is in many places thicker than the medullary.

The anterior and middle lobes of the cerebrum on each side are parted by a deep narrow sulcus, which ascends obliquely backward, from the temporal ala of the os sphenoides to near the middle of the os parietale; and the two sides of this division have each their particular ridges and circumvolutions, which gives a very great extent to the cortical substance. This sulcus is termed fissura magna silvii, or simply fissura cerebri.

The corpus callosum is a white convex body, being a middle portion of the medullary substance, whose surface is covered by the pia mater. Along the middle of its surface, from one end to another, there is a kind of raphe formed by a particular intertexture of fibres, which cross each other. After its uniting with the cortical substance, a medullary arch or vault of an oval figure is formed.

Under this arch are two lateral and shallow cavities, separated by a transparent medullary septum; and generally called the anterior superior ventricles of the cerebrum.

The above transparent partition is generally called the septum lucidum, and lies directly under the raphe or future of the corpus callosum, of which it is a continuation.

The septum lucidum is united by its lower part to the anterior portion of that medullary body improperly called the fornix, with three pillars; because it is thought to bear some resemblance to the arches of ancient vaults.

The fornix being cut off and inverted, or quite removed, we first perceive a vascular web, called plexus choroides, and several eminences more or less covered by the expansion of that plexus. There are four pairs of eminences, which follow each other very regularly, two large and two small. The first pair of larger eminences are named corpora striata, from their having a great number of white and ash-coloured streaks alternately disposed through their substance; and the second pair, thalami nervorum opticorum, because these nerves arise chiefly from them. The four small eminences are closely united together, the anterior being called nates, and the posterior testes; though it would be better to call them simply, anterior and posterior tubercles.

Immediately before these tubercles, there is a single eminence called glandula pinealis, a small, soft, greyish body, about the size of an ordinary pea, irregularly round, and sometimes of the figure of a pine apple. This gland, which Des Cartes will have to be the seat of the soul, has been often found to contain gravel.

Between the basis of the anterior pillar of the fornix, and the anterior part of the union of the optick thalami, lies a cavity or fossula, called infundibulum. It runs down towards the basis of the cerebrum, contracting gradually, and terminates by a membranous canal in a fleshy body, situated in the sella sphenoidalis, named glandula pituitaria. The infundibulum opens above, immediately before the optick thalami, by an oval hole, called foramen commune anterius, and consequently communicates with the lateral ventricles.

The cerebellum is contained under the transverse septum of the dura mater. It is broader laterally than on the fore or back-sides, flattened on the upper-side, and gently inclined both ways, answerable to the septum, which serves it as a kind of tent or ceiling. On the lower-side it is rounder, and on the back-side divided into two lobes, separated by the occipital septum of the dura mater.

It is made up, like the cerebrum, of two substances; but it has no circumvolutions on its surface. Its sulci are pretty deep, and disposed in such a manner as to form that flat strata, more or less horizontal, between which the internal lamina of the pia mater insinuates itself by a number of septa, equal to that of the strata.

Under the transverse septum, it is covered by a vascular texture, which communicates with the plexus choroides. It has two middle eminences called appendices vermiformes, one anterior and superior which is turned forward, the other posterior and inferior which goes backward. There are likewise two lateral appendices, both turned outward. They are termed vermiformes from their resemblance to a large portion of an earth-worm.

Besides the division of the cerebellum into lateral portions, or into two lobes, each of these lobes seems to be likewise subdivided into three protuberances, one anterior, one middle or lateral, and one posterior; but they are not in all subjects equally distinguished either by their convexity or limits; but they may always be distinguished by the direction of their strata, those of the middle and anterior protuberances being less transverse than in the posterior.

When we separate the two lateral portions or lobes, having first made a pretty deep incision, we discover first of all the posterior portion of the medulla oblongata; and in the posterior surface of this portion, from the tubercula quadrigemina, all the way to the posterior notch of the body of the cerebellum, we observe an oblong cavity, which terminates backward, like the point of a writing pen. This cavity is called the fourth ventricle.

The medulla oblongata is a medullary substance, situated from before backward, in the middle part of the basis of the cerebrum and cerebellum, without any discontinuation, between the lateral parts of both these bases; and therefore it may be looked upon as one middle medullary basis, common to both cerebrum and cerebellum, by the reciprocal continuity of their medullary substances, through the great notch in the transverse septum of the dura mater, which common basis lies immediately on that portion of the dura mater which lines the basis of the cranium. The medulla oblongata is therefore justly esteemed to be a third general part of the whole mass of the brain, or as the common production or united elongation of the whole medullary substance of the cerebrum and cerebellum.

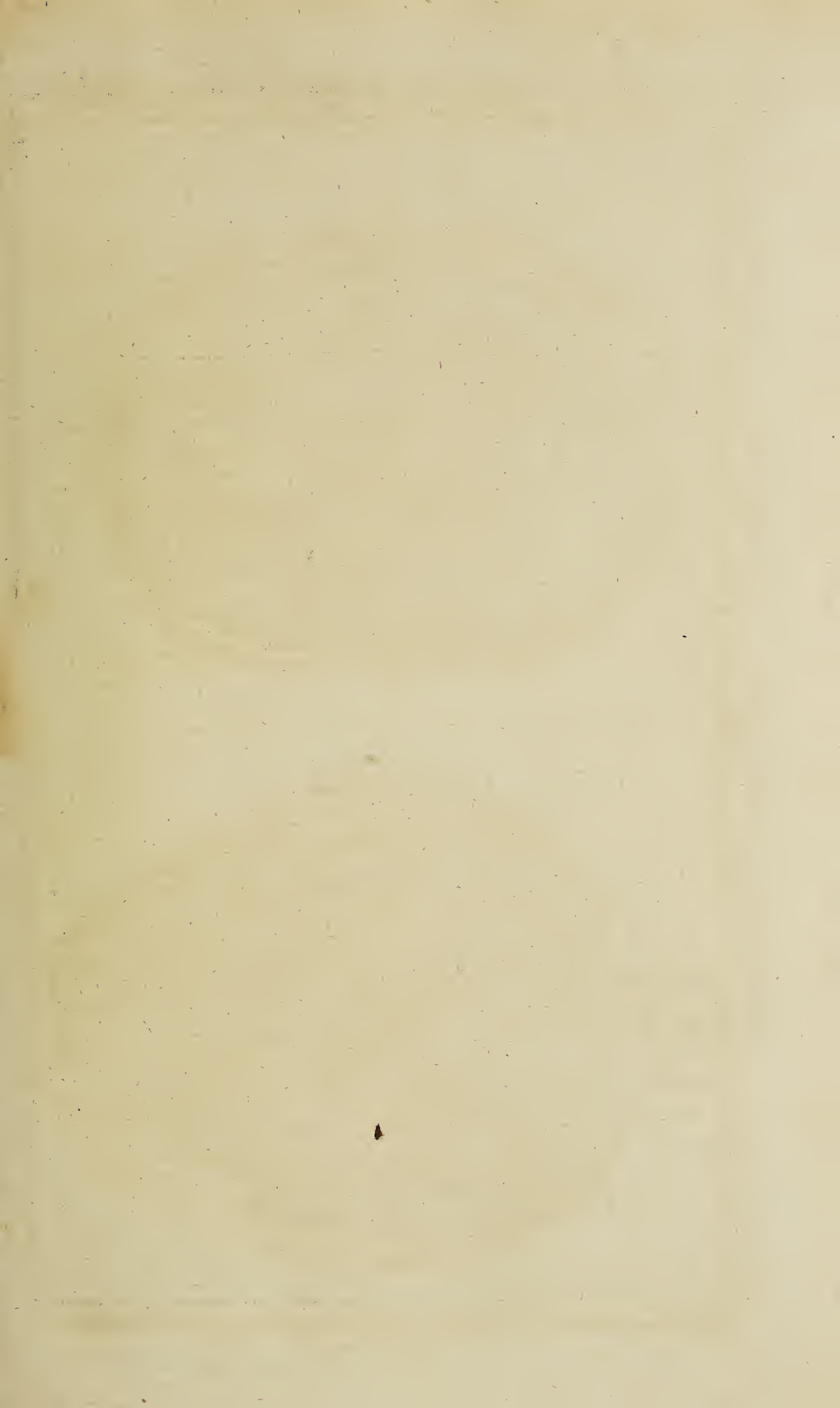
It is extremely difficult, if not altogether impossible, to examine or demonstrate it as we ought, in its natural situation; but we are obliged to do both on a brain inverted. However, to prevent false ideas either in viewing ourselves, or in shewing to others, the medullary oblongata thus inverted, it is very necessary often to call to mind that all that appears superior in that situation, is inferior in the natural state.

The lower side of the medulla oblongata, in an inverted situation, presents to our view several parts, which are in general either medullary productions, trunks of nerves, or trunks of blood-vessels.

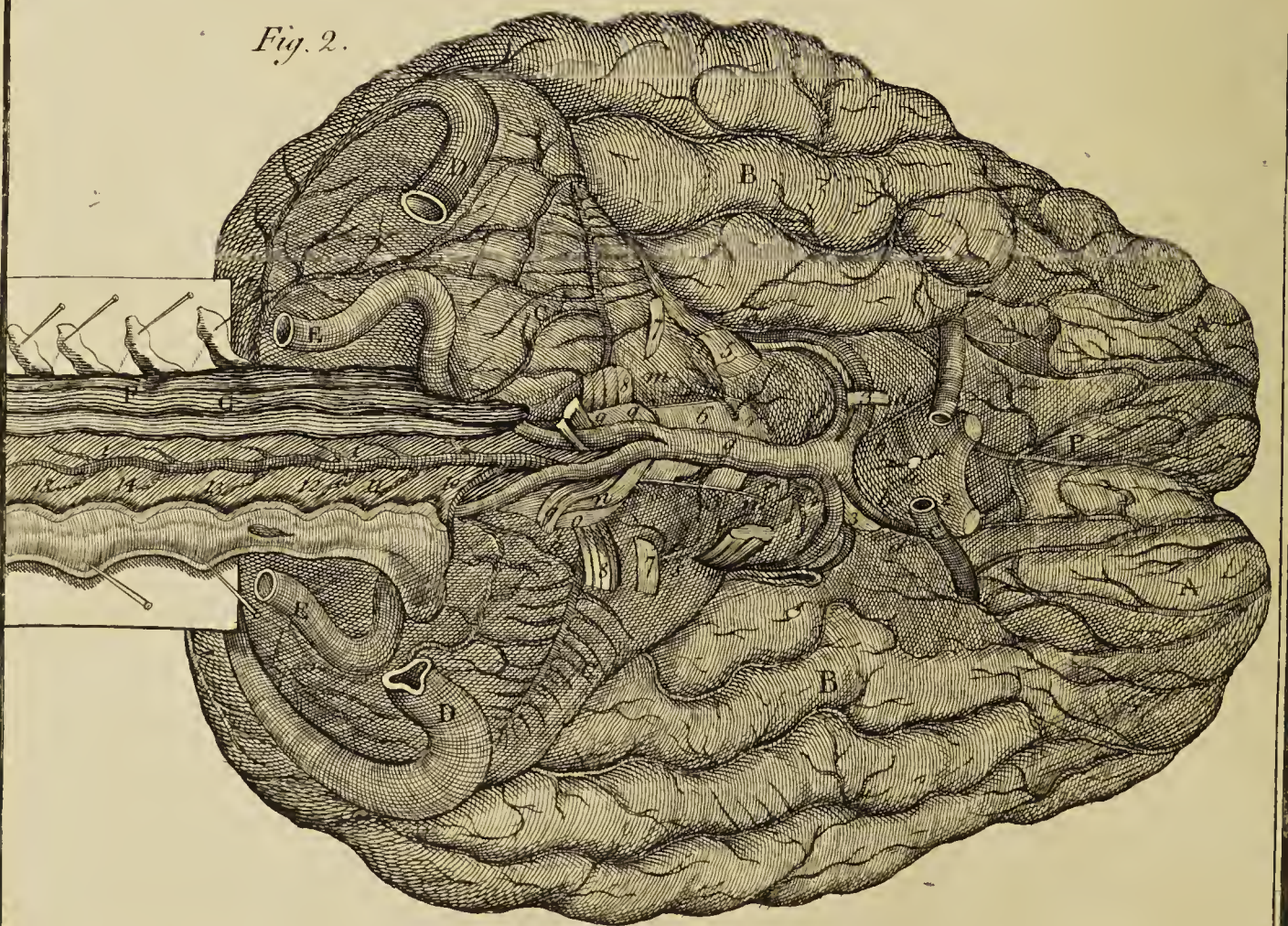
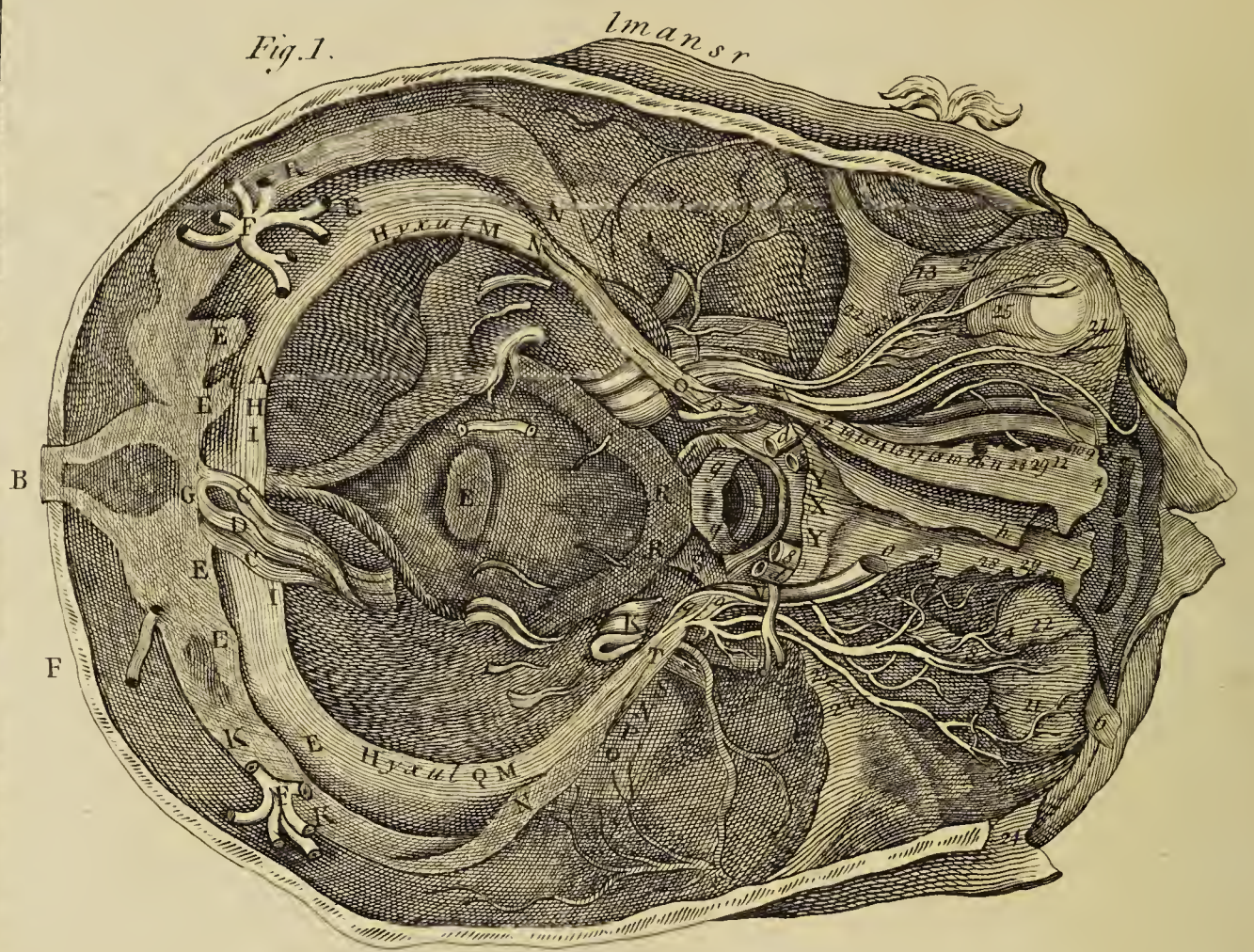
The chief medullary productions are these: the large or anterior branches of the medullary oblongata, which have likewise been named crura anteriora, femora and brachia medullae oblongatae, and pedunculi cerebri; the transverse protuberance, called also processus annularis or pons varolii; the small or posterior branches, called pedunculi cerebelli, or crura posteriora medullae oblongatae; the extremity or cauda of the medulla oblongata, with two pairs of tubercles, one of which is named corpora olivaria, the other corpora pyramidalia: and to all these productions we must add a production of the infundibulum and two medullary papillae.

We must observe in general concerning the eminences of the medulla oblongata, that those which are medullary











on their outsides or surfaces, are interiorly either entirely cortical, or partly cortical and partly medullary, or formed by a singular mixture of these two substances.

From this common portion of the cerebrum and cerebellum, arise almost all the nerves which go out of the cranium through the different foramina by which its basis is perforated. It likewise produces the medulla spinalis, which is no more than a common elongation of the cerebrum and cerebellum, and of their different substances; and therefore the medulla oblongata may be justly said to be the first origin or primitive of all the nerves which go out through the spina dorsa, and consequently of all the nerves of the human body. See the articles *MEDULLA Spinalis*, and *NERVE*.

#### Explanation of Plate XI.

*Fig. 1.* An interior view of the cerebrum and cerebellum, from Haller.

A, the transverse septum or tent of the cerebellum. B, the longitudinal sinus of the dura mater, which is divided into two branches at its posterior extremity. C, the right sinus divided into two parts, one of which communicates with the right lateral sinus, and the other with the left. D, vestiges of the falx of the brain. E, E, the large veins of the septum A. F, the insertion of the veins of the cerebrum into the lateral sinus. G, the orifice of the posterior occipital sinus. H, H, the posterior occipital sinuses on the right and left. I, I, the falx of the cerebellum. K, K, the great transverse sinus. L, L, the jugular fossæ. M, M, the sinus petrosi inferior. N, N, the sinus petrosi superior. O, O, the veins of the cerebellum which open into the above sinuses. P, P, the inferior occipital sinuses. Q, Q, the canal by which they discharge themselves, and which joins the ninth pair. R, R, the anterior and superior occipital sinuses. S, S, the communication between the sinus cavernosus and circularis. T, the orifice of the sinus petrosus superior, by which it communicates with the sinus cavernosus. V, V, sinus cavernosi. X, X, the transverse sinus of the pituitary fossa. Y, Y, the circular sinus of Ridley. Z, Z, the insertion of the anterior veins of the cerebrum into the sinus cavernosi. *a, a*, the principal artery of the dura mater. *b, b*, the vein which accompanies it. *c*, the part of the cranium which it there enters by a particular foramen. *d, d*, the internal carotid arteries in the sinus cavernosus cut off at the place where they enter the cerebrum. *e, e*, the arterial branches sent to the sinus of the nerve of the fifth pair. *f, f*, part of the internal carotid produced to the ophthalmick artery. *g, g*, the posterior apophyses clinoides. *h*, the apophysis, called crista galli. *i, i*, the frontal sinuses. *k, k*, branches of the fifth pair, distributed on the dura mater. *l*, the fourth branch of the fifth pair. *m*, the second branch. *n*, the first or ophthalmick branch. *o*, the third pair. *q*, the partition which divides the fifth and sixth pair. *r*, the sixth pair. *s*, origin of the intercostal nerve. *t, t*, entrance of the seventh pair into the dura mater. *u, u*, first insertions of the eighth pair. *x, x*, second insertions of the eighth pair. *y, y*, the ninth pair. *z*, the foramen of the medulla spinalis.

*In the right Eye, the superior Part of the Orbit taken off.*

1, 1, the ophthalmick artery. 2, 2, its exterior branch, which accompanies the nerve of the same name. 3, 3, the interior branch distributed to the nostrils. 4, 4, the sclerotic branches, several of which are distributed to the uvea. 5, 5, vestiges of the levator muscles of the eye-lid and of the eye. 6, the extremity of the levator of the eye-lid. 7, the lacrymal gland. 8, The optick nerve. 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, the same as in the eye of the opposite side.

*In the left Eye.*

9, the annular cartilage. 10, the great oblique muscle. 11, the levator of the eye. 12, the abductor or internal muscle of the eye. 13, The abductor cut off. 14, the superior branch of the third pair, distributed to the eye and eye-lid. 15, the other part of the trunk. 16, branch to the nerve to the obliquus inferior. 17, branch to the right inferior of the eye. 18, branch to the right internal. 19, branch to the ophthalmick ganglion. 20, supe-

rior branch of the first branch of the fifth pair. 21, the exterior rope of that branch. 22, interior rope. 23, exterior branch of the first branch of the fifth pair. 24, small branches extended to the face, through the foramina of the ossa malarum. 25, branches to the lacrymal gland. 26, inferior branches of the second branch of the fifth pair. 27, rope of that branch to the ganglion. 28, small filaments to the nostrils. 30, the ophthalmick ganglion. 31, the small ciliary nerves. 7, 8, the same as in the right eye.

*Fig. 2.* From Ridley.

Exhibits the basis of the brain, with part of the medulla oblongata, the blood vessels being injected with wax.

A, A, the fore lobes of the brain.  
B, B, the hinder lobes.  
C, C, the cerebellum.  
D, D, the lateral sinuses.  
E, E, the vertebral arteries, as they pass between the first vertebra and the bone of the occiput.  
F, the vertebral sinus.  
G, G, G, G, G, the dura mater on the right side taken off from the spinal marrow, and remaining on the left.  
1, 2, 3, 4, &c. the ten pair of nerves belonging to the brain, with seven of the spinal marrow.  
*a*, the foramen that opens into the pituitary gland from the infundibulum.  
*b, b*, the two white protuberances behind the infundibulum.  
*c, c*, the two trunks of the carotid artery cut off where they began to run betwixt the fore and hinder lobes of the brain.  
*d, d*, the two arteries joining the carotids, with the cervical artery called the communicant branches.  
*e, e*, two large branches of the cervical artery, sometimes seeming as though they came from the communicant branch on each side, from the first of which the plexus choroides hath its original in chief, and from the last the plexus choroides of the fourth ventricle.  
*f*, several little branches arising from the carotid artery.  
*g*, the cervical artery composed of the two trunks of the vertebral artery within the cranium.  
*h, h*, the two trunks of the vertebral artery.  
*i, i, i*, the spinal artery.  
*k*, a small branch of an artery running through the ninth pair.  
*l, l*, the crura of the medulla oblongata.  
*m, m*, the annular protuberance, or pons varolii.  
*n*, that part of the caudex medullaris on the right side, called, by Willis and Vieussenius, corpora pyramidalia.  
*o*, that part on the same side called corpus olivare.  
*p*, the foremost branch of the carotid artery, dividing the fore lobes of the brain, consisting of two branches, one of them only appearing here.  
*q, q*, little branches of arteries helping to make the plexus choroides in the fourth ventricle.  
*r, r, r, r*, branches of arteries dispersed from the cervical artery upon and through the annular protuberance.  
*s, s*, part of the second process or pedunculi of the cerebellum.  
*t, t*, the spinal accessory nerve.

*Uses of the BRAIN, and of its Appendages in general.* — We are obliged to the great Malpighi for the first and best instructions concerning the manner of examining the structure of the brain, especially that of the two substances of which it is made up, and for putting us in a condition to be able to conjecture something about its uses. The experiments and observations of that illustrious and faithful searcher into nature, having been repeated by several excellent philosophers, and confirmed by comparative anatomy, leave us no room to doubt but that the brain is a secretory organ, or as it is called by anatomists a gland.

It is to no purpose to dispute about words, when we are agreed as to the things themselves. Anatomists have for many years past understood by the word gland, an organ fitted to separate some particular fluid from the



mass of blood, as universally as they mean by the word muscle, all sorts of fleshy fibres capable of contraction; and this last term might be cavilled at and rejected as justly as the other.

The whole matter of secretions must be owned to be very obscure; but it is to be hoped that the brain and liver will some time or other lead us so far into the knowledge of it, as at least to be able to distinguish truth from falsehood.

The greyish or ash-colour of the cortical substance is not the effect of a particular mixture of red and white; at least we have no experiment to prove it. The blood indeed gives this substance a slight redish cast; but the ash-colour, which seems to be the characteristic of the structure of these secretory organs, is not owing to that.

We learn from M. Ruysch's Anatomical Injections, that the cortical substance is chiefly composed of vessels; that by making these vessels swim in a clear pellucid liquor, their extremities represent an infinite number of fine brushes or vascular tufts, and that his injection fills even the smallest filaments of these tufts. He tells us likewise, that in these last filaments the structure is altered; and that by the mechanism of this change, the functions attributed to glands may be performed.

But still these injections and preparations do not unravel the mystery; neither is the existence of these pencils or tufts sufficiently demonstrated; for they are only the last extremities of the smallest arteries macerated in water, or some other liquor, after being injected; and then artfully separated from the other essential parts of the organ.

In the first place they are separated from the venal extremities which must answer to these tufts, in what manner soever that be brought about. Secondly, they are separated from the membranous filaments of the pia mater, which in the natural state tie these arterial extremities to each other, and give them a different disposition from that of tufts or pencils. Thirdly, by this preparation, the arterial extremities are separated from their connections with the medullary substance; which both experiments and comparative anatomy shew to be fibrous.

It is no ways surprising that these capillary extremities, thus stripped, should float loosely and freely, when moved in a fluid; and that they should put on the appearance of pencils or tufts, being in this state only the truncated extremities of small vessels. When we consider these circumstances attentively, we find ourselves obliged to return to the small glandular bodies and folliculi, &c. of Malpighi, and at the same time we must acknowledge that Ruysch's fine injections have discovered these minute bodies to be of a vascular substance, the structure of which we are still ignorant of.

In a word, Malpighi has discovered the glandular tubercles and folliculi, without destroying their natural connections. Ruysch has discovered a considerable part of their structure, by destroying their connections. We are therefore very much beholden to both these illustrious anatomists, and it is only by joining these observations to each other, that we can ever be able to form an idea of the secretory organs, which will answer all the phenomena concerning the different secretions in the human body.

The infinite number of these small secretory clusters, strain or filter the mass of blood carried to them by the numerous ramifications, and separate from it an excessively fine fluid; the remaining blood being conveyed back by the same number of venal extremities into the sinuses of the dura mater, and from thence into the jugular and vertebral veins.

This subtle fluid, commonly called animal spirit, nervous juice, or liquor of the nerves, is continually forced into the medullary fibres of the white portion of the cerebrum, cerebellum, medulla oblongata, and medulla spinalis; and by the intervention of these fibres supplies and fills the nerves, which are a continuation of them.

All the nervous ropes, as they pass through the foramina of the cranium and vertebræ, are accompanied by particular elongations of the pia and dura mater. Those of the dura mater serve them for vagina in their

passage through the bony openings. Those of the pia mater not only accompany and invest each nervous rope, but also form internal septa, between all the filaments of which each rope consists. It is known from many experiments, that the nerves are the primitive or original organs of all muscular motion, and of all animal sensation; and that these two functions depend in general on the brain; but we are ignorant of the nature of this dependence, and of the particular uses of the medullary fibres, of the nervous fluid, and of the membranous productions which accompany the fibres and nerves.

Neither is there any thing certain in what has been said concerning the design or particular uses of the superficial conformation of the cerebrum and cerebellum, or of the different configuration of their turnings, circumvolutions, eminences, depressions, expansions, and various folds. It may be affirmed in general, that by this structure the extent of the secretory organ of the nervous fluid is increased very considerably, and the particular functions of each nervous rope distinguished, and likewise their general and reciprocal correspondence, both in regard to the exquisiteness of the organs of sensation, and the activity of the organs of motion.

The falx of the dura mater hinders one portion of the cerebrum from pressing on the other, when we lie on one side. The transverse septum serves for a tent to the cerebellum, and defends it from a mortal compression, which it must otherwise be liable to from the cerebrum, especially when we walk or jump.

The septum and productions of the pia mater connect and strengthen all the circumvolutions, divisions, and ridges of the cerebrum, cerebellum, &c. and sustain in a general and almost incomprehensible manner all the branches and ramifications of the blood vessels, all the medullary filaments, and all the elongations and ropes that depend on these.

**BRAKE** denotes female fern, or the place where it grows: Also a sharp bit or snaffle for horses; and a baker's kneading trough: Also an instrument with teeth, to bruise flax or hemp.

**BRAMBLE**, or **BRAMBLE-BUSH**, in botany, the English name of the rubus. See **RUBUS**.

**BRAMINS**, the name of the priests among the idolatrous Indians; the successors of the ancient brachmans. See **BRACHMANS**.

**BRAN**, the skins or husks of corn, especially wheat ground, separated from the flour by a sieve or boulder.

It is of wheat-bran that starch-makers make their starch. The dyers reckon bran among the non-colouring drugs; because it yields no colour of itself. It serves for the making of their sour waters, used in preparing stuffs to take the dye.

**BRANCH**, in botany, an arm of a tree, or a part which sprouting out from the trunk, helps to form the head or crown thereof.

**BRANCHES** of a *bridle*, in the manege, are two pieces of iron bended, which, in the interval, between the one and the other, bear the bit-mouth, the cross-chains, and the curb; so that on one end they answer to the head-stall, and on the other to the reins, in order to keep the horse's head in subjection.

**BRANCHES** of *ogives*, in architecture, are the arches of Gothick vaults. These arches traversing from one angle to another diagonal wise, form a cross between the other arches, which make the sides of the square, of which the arches are diagonals.

**BRANCHIÆ**, or **GILLS**, in the anatomy of fishes, the parts corresponding to the lungs of land-animals, by which fishes take in and throw out again a certain quantity of water, impregnated with air. All fishes, except the cetaceous ones and the petromyzum, are furnished with these organs of respiration; which are always eight in number, four on each side the throat. That next the heart is always the least, the rest increasing in order as they stand near the head of the fish.

**BRANDY**, a spiritous and inflammable liquor, extracted from wine and other liquors, by distillation, which is commonly performed by the *balneum marie*; but sometimes also by a small flaming fire. See **DISTILLATION**.



The vessels used in this operation, are commonly of copper; some distillers, in order to cool the brandy, make the neck of the matrafs, which is very long, and of a serpentine or winding figure, pass through a tun of cold water.

In order to distil brandy, they fill the cucurbit half full with the liquor they would extract it from, which they put over a moderate fire, till about the sixth part of it be distilled, or till they perceive that what falls into the recipient, is no longer inflammable. Brandy distilled a second time, is called spirit of wine; and this spirit, purified again by one or by several distillations, is what they call spirit of wine rectified. The second distillation is made in the *balneum mariæ*, and in a glass cucurbit, till the brandy that was put into it be reduced into one half, and this half is again rectified, as often as the operator thinks proper. To try the goodness of the rectified spirit of wine, you must examine whether, when lighted into a blaze, it consumes intirely, without leaving any impurity behind: or rather, which is surer still, whether, having put some gunpowder at the bottom of the spirit you would try, the powder takes fire, when the spirit is consumed; in which case, the spirit is good. With regard to brandy (we speak only of that which is distilled from wine) they who trade in it, choose it white, clear, of a good taste, and such as will bear the test or proof; that is to say, that when poured into a glass, it forms on the top of it a little white lather, which, as it diminishes, makes a circle; there being no brandy but that which is well deflegmated, and does not retain too much humidity, wherein this bead-proof, as it is called, will be entirely formed.

The chief use of brandy is as a drink, particularly in the northern countries, among the negroes of Guinea, who will sell one another for some bottles of brandy, and among the savages of Canada, who are extremely fond of it, but to whom the French are forbidden to give any, under very severe penalties: brandy is also used in medicine, to strengthen the nerves; and in dying, rectified spirits of wine being reckoned by the dyers among the non-colouring drugs.

*Method of colouring BRANDY.* All brandies, when first made, are as clear as water, and do grow higher coloured by long keeping; however, they are artfully made of any colour several ways.

To make a light straw-colour, use turmeric, or a little treacle: but the best way to give it a colour or tincture is with a little burnt sugar, made to a consistence; or syrup of elder-berries may be used, which gives an admirable colour, and may be made deeper or lighter, according to the quantity you put in.

Besides the brandy made of wine, there is some also made of beer, cyder, syrups, sugar, molasses, fruit, grain, &c. however, these are not properly called brandy; but go under the general denomination of spirits, which see.

Wine brandy made in France, is esteemed the best in Europe. They make it wherever they make wine, and for that purpose, use wine that is pricked, rather than good wine. The chief brandies for foreign trade, and those accounted best, are the brandies of Bourdeaux, Rochelle, Cogniac, Charenton, the isle of Rhe, Orleans, the country of Blaisois, Poictou, Touraine, Anjou, Nantes, Burgundy, and Champaign.

**BRASIL-WOOD**, or **BRAZIL-WOOD**, an American wood of a red colour, and very heavy. It is denominated variously, according to the places from whence it is brought: thus we have brasil from Fernambuco, Japan, Lamon, &c.

The brasil-tree ordinarily grows in dry barren places, and even in the clefts of rocks: it is very thick and large, usually crooked and knotty: its flowers, which are of a beautiful red, exhale a very agreeable smell, which strengthens the brain. Though the tree be very thick, it is covered with so gross a bark, that when the savages have taken it off, the wood or trunk, which was before the thickness of a man, is scarce left equal to that of his leg.

This wood must be chosen in thick pieces, close, sound, without any bark on it, and such as, upon

splitting, of pale becomes redish, and, when chewed, has a saccharine taste. It is much used in turned work, and takes a good polish: but its chief use is in dying, where it serves for a red colour: it is a spurious colour, however, that it gives, and easily evaporates and fades; nor is the wood to be used without alum and tartar. From the brasil of Fernambuco, is drawn a kind of carmine, by means of acids: there is also a liquid lacca made of it for miniature.

The tree has many distinctions among botanists: but it is agreed on by all to be a species of the faunders, and possessed of the same physical virtues; though it is seldom or ever prescribed by physicians.

**BRASS**, a fictitious metal composed of copper and lapis calaminaris; and made in the following manner.

The lapis calaminaris is first calcined, ground to an impalpable powder, mixed with fine charcoal, and blended into a kind of paste with warm water. Seven pounds of lapis thus prepared is put into a melting pot, and about five pounds of copper laid upon it. The melting pot is then let down into a wind furnace, where it continues in a strong heat, eleven hours, in which time the metal is converted into brass. In this process, the calamine does not enter the copper in its earthy state; it is first converted by the phlogiston into the form of a metal.

**BRASS Lumps**, in mineralogy, a common name given by the miners and diggers of coal, &c. to the globular pyrites. This stone, when kept in the air, often sends forth its efflorescences of salt, in the form of small and slender fibres, perfectly transparent, and sometimes of near an inch long. The place where these stones are exposed to the air, will greatly alter the figures and colours of the efflorescences; if they are laid in a cellar, the shoots will be shorter, and green, like the common copperas; and, if laid in the way of the sun-shine, they will be white and dusty.

Both are the same salt, which is true green vitriol or copperas, and both will, in the same manner, turn a decoction of galls into ink. The white salt is only the green powdered and calcined by the sun's heat. The figure of the fibres of these efflorescences is not easy to be determined; sometimes they seem round, sometimes angular. These, however, are the natural figures of the salts of these stones; and the other shoots into which they form themselves after solution, and bringing them together in a body by water, are rather their accidental forms, though, under a like course of accidents, they generally appear the same. *Philos. Transf.* No. 110.

**BRASSICA**, or **CABBAGE**, in botany, a genus of the tetradynamia filiquosa class. The calix is erect and connivent; the seeds are globular; and there is a nectariferous gland between the pistillum and the short stamina, and between the calix and the long stamina. There are ten species of this plant, most of which are excellent pot-herbs, and cultivated in our gardens.

**BRAULS**, the name of a species of cloth imported from the E. Indies, composed of blue and white stripes.

**BRAURONIA**, in antiquity, a festival celebrated at Brauron, an Athenian town, once in five years by the ancient Greeks, in honour of Diana.

**BRAWN**, the flesh of a boar, boned, rolled up, or collared, and lastly pickled.

**BRAZIER**, a tradesman, who makes and sells copper and brass vessels.

**BRAZING**, the foldering or joining two pieces of iron together by means of thin plates of brass melted between the pieces that are to be joined.

**BREACH**, in fortification, a gap, or opening, in any part of the works of a town, by the artillery or mines of the besieged. (*Plate IX. fig. 11.*) represents a breach made in a wall or bastion by the explosion of a mine.

**BREAD**, a well-known food chiefly divided into white, wheaten, and household; but differ only in the degrees of purity. In the first of all the bran is separated; in the second only the coarser; in the third, none at all; so that fine bread is made only of flour; wheaten bread of flour, with a mixture of fine bran; and



and household, of the whole substance of the grain, without taking out either the coarse bran, or fine flour.

We also meet with symnel bread, manchet or roll bread, and French bread: which are only so many denominations of the finest or whitest bread, made of the purest flour; except that in roll bread, there is an addition of milk, and, in French bread, of eggs and butter also. To which may be added, ginger-bread, made of white-bread, with almonds, liquorice, anniseed, rose-water and sugar; and maslin-bread, made of wheat and rye, or sometimes of wheat and barley.

The process of making household bread amongst us, is thus; to a peck of meal they add a handful of salt, a pint of yeast, and three quarts of water, cold in summer, hot in winter, and temperate between the two; the whole, being kneaded in a bowl or trough by the fire in winter, from it in summer, and a little yeast added, will rise in about an hour; they then mould it into loaves, and put it into the oven to bake. *Hought. Collect.*

For leavened bread, part of the flour intended for it, being made into dough with warm water and a little salt, is laid in the rest of the flour an hour or more, in which time it rises to three times the bulk; then they mix and knead the whole with more water, till it be brought into a stiff dough; which, being formed into loaves, is baked in the oven: though the more usual way is to take a piece of dough kneaded, and leave it in the tub till next time, when they break it small, and mix it with the meal, adding some yeast. *Hought. Collect.*

For French bread, they take half a bushel of fine flour, ten eggs, and a pound and a half of fresh butter, into which they put as much yeast, with manchet; and tempering the whole mass with new milk, pretty hot, let it lie half an hour to rise; which done they make it into loaves or rolls, and wash it over with an egg beaten with milk; care is taken the oven be not too hot. *Russ Dict.*

BREADTH, in geometry, is one of the three dimensions of magnitude, and which being multiplied by the length, produces the area of the surface.

BREAKERS, among seamen, implies the waves dashing violently over the rocks immediately under the surface of the water, covering that part of the sea with foam.

BREAMING, among shipwrights, implies the operation of burning off the filth, such as grass, ooze, or shells, for a ship's bottom, accumulated there by being a considerable time either at sea, or in the harbour.

BREAMING is performed by holding kindled furze or faggots to the ship's bottom: the flame immediately incorporating with the pitch, sulphur, &c. that had formerly covered the bottom, directly loosens and throws off whatever excrement may have adhered to it: after this cleansing, it is covered a-new with a composition of tallow, sulphur, turpentine, &c. and this not only makes the bottom smooth and slippery, so that it more readily divides the fluid, but greatly contributes to poison the worms that eats through a ship's planks, as long as it remains there.

BREAST, *Pectus*, in anatomy, the fore part of the thorax. See the article THORAX.

BREASTS, *Mammæ*, two glandulous tumours, of a roundish oval figure, situated on the anterior, and a little towards the lateral parts of the thorax: these are most remarkable in women; and in order to their being an ornament, they should be of a moderate size, their skin should be white and soft, their substance firm, not flaccid or pendulous, and the nipple red; they should also stand at a considerable distance. In different persons, however, their size is very various and uncertain. In virgins, they are usually small: in women with child, or who give suck, they are larger, often very enormous. In very young and very old persons they are always small. The time of the breasts growing full, in women, is about the age of fourteen; and the most natural time of their decreasing, is about the fiftieth year. The nipple of the human breast is a tumid, cylindrical body, of a red colour, placed on the middle of the breast, and surrounded with a circle: its substance is cavernous, almost like

that of the human penis; and hence it is capable of erection.

The breasts, besides the common integuments of the body, viz. the epidemis, cutis, and fat, are composed of a glandulous substance, of a whitish colour, not unlike that of the udders in quadrupeds. This forms the inner central part, to the midst of which the nipple answers; and is surrounded by a quantity of fat, which makes by much the greater part of the breast.

Among this glandulous substance are found, beside the blood vessels, a multitude of lactiferous ducts, or small tubes, which unite by frequent anastomoses: these tubes are larger in women who give suck, and are dilated into sinuses in many places, forming a kind of cells, which hold the secreted milk, and communicate with the veins and arteries. All these parts are to be seen much more distinctly in breasts that are large and full of milk, than in others: in young women, indeed, they are scarce to be distinguished at all; also in such as have little breasts, in such as are emaciated, and in those of very old people.

The arteries and veins of the breasts are called mammary ones.

The nerves proceed from the dorsal ones or spinal marrow.

BREAST-FAST, among seamen, a hawser, or other strong rope, holding a ship with her broad side to a wharf, &c.

BREAST-HOOKS, among shipwrights, are strong crooked pieces of timber laid across the inside of a ship's bones, and bolted to the stem, and fore-most timbers.

The breast-hooks are the principal support of a ship forward, as they bear all the shock of resistance she receives in dividing the water.

BREAST-PLATE, in antiquity, a piece of defensive armour worn at the breast.

BREAST-PLATE, in the menage, implies the piece of leather extending across the horse's breast, from one side of the saddle to the other.

BREAST-PLOUGH, a small plough contrived in such a manner that a man may shove it before him. It consists of a cutting iron about eight or nine inches long, and having one of its sides turned up to cut the turf. This iron is fixed to a pole bending upward about five or six feet long, and forked at the upper-end, having a crutch or cross-handle, mortised into the forks. Against this crutch the ploughman places his breast, and shoves along the plough in order to turn up the turf, its only use being for cutting up the surface of the ground in the operation called burn-baking.

BREAST-WORK, the same with parapet. See the article PARAPET.

BREECH, of a great gun, or cannon, the end next the touch-hole.

BREECHINGS, in the sea-language, the ropes with which the great guns are lashed, or fastened to the ship's side.

They are thus called, because made to pass round the breech of the gun.

BREEDING, in a general sense, the producing, nourishing, and educating all manner of young animals.

BREEZE, a shifting wind, that blows from sea or land for some certain hours in the day or night; common in Africa, and some parts of the E. and W. Indies.

The sea breeze is only sensible near the coasts; it commonly rises in the morning, about nine, proceeding slowly in a fine small black curl on the water, towards the shore; it increases gradually till twelve, and dies about five. Upon its ceasing, the land-breeze commences, which increases till twelve at night, and is succeeded in the morning by the sea-breeze again.

BREEZE, among brickmakers, implies ashes and cinders, which they sometimes substitute instead of coals in burning their bricks.

BREST, or BREAST, in architecture, a term sometimes used for the member of a column, more usually called *tore*. See the article TORE.

BREST SUMMERS, in structures, built of timber, are the pieces into which the girders are framed.

BREEVE,



**BREVE**, in mufick, the name of a character of a fquare form, without a tail, and equal in length to two femi-breves.

**BREVIARY**, a book containing the divine fervice of the Romifh church.

**BREVIER**, among printers, is a fmall type, or letter, between nonpariel and burgeois.

**BREVIS**, in anatomy, a name given to feveral mufcles of the human body, on account of their fhortnefs. See the article *MUSCLES of the human body*.

**BREVITY**, fhortnefs, in literary affairs, implies a nervous perfpicuous ftile, freed from all fuperfluous words, &c. but care muft be taken that brevity do not degenerate into obfcurity.

**BREW-HOUSE**, a houfe erected for the purpofes of brewing.

The conveniency of water is one of the firft things to be attended to in erecting a brew-houfe, becaufe the frequent carriage of that neceffary fluid greatly enhances the coft of the beer. The water fhould be foft, and if fupplied from an adjacent river, it fhould be conveyed by a paffage under ground, in order to its being pumped up from thence into the copper, or into troughs properly placed for carrying it where it may be wanted. If there be a refervoir for rain water, it fhould be made as near the brew-houfe as poffible.

The brew-houfe fhould be fo fituated as to face the north for fhade and coolnefs. It fhould be near as poffible to the cellar, that the labour and expence attending the carriage of the liquor may be faved, and the danger of expofing it to either too hot or too cold an air prevented. The floor fhould be paved with ftone or hard bricks, and raifed in the middle, to give an eafy difcharge to the water, fo as to keep the brew-houfe always clean.

The copper fhould be proportioned to the quantity brewed, and fhould be raifed fo high that the water may run from it to the mafh-tub, and the wort to the coolers. For this purpofe, there fhould be either a cock in the fide at the bottom of the copper, or a brafs pump fhould be fixed to its fide, by means of which the water or wort may be conveyed through a trough to their proper receptacles.

The mafh-tub fhould be round, not too deep, and perfectly fmooth on the infide. It fhould have a falfe bottom, which may ferve as a ftrainer, when by turning a cock placed below, the wort may be drawn off in the receiver: or the wort may be let out by means of an upright plug furrounded with a bafket-ftrainer.

The receiver fhould be lined with milled lead, which is eafily kept perfectly clean, and is not apt to contract any bad tafte or fcent, as wood is known to do, notwithstanding the greateft care. The beft method of conveying the wort from the receiver to the copper, is by means of a hand-pump.

There fhould be two coolers, or backs, as the brewers call them. They fhould alfo be lined with milled lead, or made of the heart of oak rendered perfectly fmooth; and placed as near as convenient to the copper.

The working vefel or tun fhould be placed at fome fmall diftance from the cooler. It fhould be round, but not lined with lead; becaufe this would cool the liquor too much in cold weather, during the fermentation.

The cellar fhould, as already obferved, be near, if poffible, and funk much lower than the working-tun, that the beer may be conveyed into the casks by a cock and hofe, or fome other eafy method.

There muft be in the brew-houfe an oar to ftir the malt in the mafh-tub, with bowls, pails, and other utenfils, neceffary in different operations. Thefe, as well as every other implement employed in brewing, fhould be boiled in the copper, or well fcalded every time before they are ufed.

Too great care cannot be taken to keep every vefel perfectly clean and fweet: for if they are the leaft tainted, the liquor will contract a difagreeable fcent. When any taint is fufpected, the vefels fhould be well wafhed with a ftrong ley of clean wooden afhes. This ley fhould be put into them fcalding hot, and every joint, crevice, and fmalleft hollow muft be well fcrubbed. If there are no afhes to be had, lime may be

flaked in water in the vefels; and if this be done in casks, they may be bunged up as foon as the ebullition is over, and not opened till three days after. The more effectually to prevent the lodging of any kind of filth, the fides of every vefel fhould be as fmooth as poffible; and after every brewing they fhould be wafhed with boiling water, and laid up dry.

**BREWING**, the operation of preparing ale, or beer, from malt. The ufual procefs of brewing is as follows: the ingredients being ready, the water muft be made to boil very fpeedily, and while boiling with the greateft violence the fire muft be immediately damped or put out; when the height of the fteam is over, the water is put into the mashing-tub to wet the malt; then fo much being poured out as to make it of a confiftence ftiff enough to be rowed up, let it ftand thus a quarter of an hour, after which another quarter of the water is added, and rowed up as before; at laft the full quantity of water is poured upon it, and that in proportion as the liquor is intended to be ftrong or weak: this part of the operation is called mashing. Afterwards the whole may be left to ftand two or three hours, more or lefs, according to the ftrength of the wort, or the difference of the weather; then let it run into the receiver, and mafh again for a fecond wort in the fame manner as for the firft, only the water muft be cooler, and muft not ftand above half the time.

The two worts being mixed together, the quantity of hops that is defigned may be added thereto, and the liquor put into the copper, which being clofely covered up, let it boil gently for the fpace of an hour or two; then let the liquor into the receiver, and the hops ftrained from it into the coolers.

When cool, the yeast is applied; which done, it is left to work or ferment, till it be fit to tun up.

For fmall beer there muft be a third mashing; the water muft be near cold, and to ftand not above three quarters of an hour; to be hopped and boiled at difcretion.

For double ale, or beer, the two liquors coming from the two firft mashings muft be ufed as liquor for a third mashing of frefh malt. For fine ale, the liquor thus brewed is further prepared with molaffes: inftead of yeast or barm, fome ufe Caftile foap, others flour and eggs, others an effential oil of barley, others a quinteffence of malt, others of wine, and others the fal panariftus.

In ordering vefels for the prefervation of beer, they muft not at one time be fcalded, and at another wafhed with cold water: fome rub the vefels with hop-leaves, that come out of the wort, and fo rinfes them again; then being dried in the air, and headed, they take a long piece of canvas, and dipping it in brimftone make matches thereof, and with a few coriander-feeds fet fire thereto: others opening the bung let the match burn in the vefel, keeping in as much as they can of the fulphureous fume, by laying the bung lightly on, and when the match is burnt, they flop all clofe for a little time; then being opened, and coming to the air, the cask is found to be as fweet as a violet.

**BREYNIA**, in botany, a genus of polyandrious plants, claffed by Linnæus with the capparis. There are two fpecies of this genus, both of which are both natives of the warmer parts of America; and being impatient of cold, they muft be kept in a hot houfe in this climate.

**BRIAR**, in botany, a fpecies of the rofe. See the article *ROSE*.

**BRIBERY**, in law, the receiving or giving a gift or reward, for performing any thing, that ought to be done freely and voluntary.

**BRICIANI**, thofe of the order of that name. This was a military order, intituted by St. Bridget, princefs of Sweden, who gave them the rules and conftitutions of thofe of Malta and St. Auguftin. This order was approved by pope Urban V. They were to fight for the burying of the dead, to relieve and affift widows, orphans, the lame, fick, &c.

**BRICK**, a fat redifh earth, formed into long fquares, four inches broad, and eight or nine long,



by means of a wooden mould, and then baked or burnt in a kiln, to serve the purposes of building.

Bricks are of great antiquity, as appears by the sacred writings, the tower and walls of Babylon being built with them. In the east they baked their bricks in the sun; the Romans used them unburnt, only leaving them to dry for four or five years in the air.

The Greeks chiefly used three kinds of brick; the first whereof was called *διδαρον*, i. e. of two palms; the second, *τετραδαρον*, of four palms; the third, *πενταδαρον*, of five palms. They had also other bricks, just half of each of those, to render their works more solid, and also more agreeable to the sight, by the diversities of the figures and sizes of the bricks.

BRICKLAYER, a person whose business it is to build houses, walls, &c. with bricks.

BRIDE, a woman newly married. Among the Greeks it was customary for the bride to be conducted from her father's house to her husband's in a chariot, the evening being chosen for that purpose, to conceal her blushes; she was placed in the middle, her husband sitting on one side, and one of her most intimate friends on the other; torches were carried before her, and she was entertained in the passage with a song suitable to the occasion. When they arrived at their journey's end, the axle-tree of the coach they rode in was burnt, to signify that the bride was never to return to her father's house. Among the Romans, when a bride was carried home to her husband's house, she was not to touch the threshold at her first entrance, but was to leap over it.

BRIDEGROOM, a man newly married, the spouse of the bride.

The Spartan bridegrooms committed a kind of rape upon their brides; for matters being agreed on between them two, the woman that contrived and managed the match, having shaved the bride's hair close to her skin, dressed her up in man's cloaths, and left her upon a mattrass; this done, in came the bridegroom, in his usual dress, having supped as ordinary, and stealing as privately as he could to the room where the bride lay, and untying her virgin girdle, took her to his embraces; and having staid a short time with her, returned to his companions, with whom he continued to spend his life, remaining with them by night as well as by day, unless he stole a short visit to his bride, which could not be done without a great deal of circumspection, and fear of being discovered.

BRIDEWELL, a work-house, or place of correction for vagrants, strumpets, and other disorderly persons.

These are made to work, being maintained with cloathing and diet; and when it seems good to their governors, they are sent by passes into their native countries: however, while they remain here, they are not only made to work, but, according to their crimes, receive once a fortnight, such a number of stripes as the governor commands. Yet to this hospital several hopeful and ingenious lads are put apprentices, and prove afterwards honest and substantial citizens.

BRIDGE, an edifice either of stone or timber, consisting of one or more arches erected over a river, canal, or the like, for the conveniency of crossing or passing over from one side to the other.

The first inventor of bridges, as well as of ships and crowns, is, by some learned men, supposed to be Janus; their reason is, that, in several ancient Greek, Sicilian, and Italian coins, there are represented on one side a Janus, with two faces, and on the other a bridge, or a crown or ship.

The parts of a bridge are the piers, or legs, pilæ; the arches; the pavement, or way over for cattle and carriages, the foot-banks on each side for foot passengers; the rail or parapet which incloses the whole; and the buttments, or ends of the bridge on the bank.

Bridges are a sort of edifices very difficult to execute, on account of the inconvenience of laying foundations, and walling under water. The earliest rules and instructions relating to the building of bridges are given by Leon Baptista Alberti, *Archit.* l. 8. Others were afterwards laid down by Palladio, l. 3. Serlio, l. 3. c. 4.

and Scamozzi, l. 5. all of which are collected by M. Blondel, *Cours d'Archit.* P. 5. l. 1. p. 629. *seq.* The best of them are also given by Goldman. *Baukunst*, l. 4. c. 4. p. 134, and Hawksmoor's *History of London Bridge*, p. 26. *seq.* M. Gautier has a piece, expressive on bridges, ancient and modern, *Trait. des Ponts.* Paris 1716, 12°.

The conditions required in bridges are, that they be well-designed, commodious, durable, and suitably decorated. The piers of stone bridges are to be equal in number, that there may be one arch in the middle where commonly the current is strongest: their thickness is not to be less than a sixth part of the span of the arch, nor more than a fourth. They are commonly guarded in front with an angular starling, or spur, to break the force of the current, though this defence is sometimes also turned semicircularly; in the ancient bridges it is always a right angle, which has the advantage of being stronger and more durable than acute ones. The strongest arches are those whose sweep is a complete semicircle; as for the rails, the height, ornaments, and the like, they are left to discretion. It is even complained, that no demonstrative reasons are given of the several proportions of the most essential parts of bridges; much of which is still left to the discretion of the builder, to be regulated according to the circumstances, design, place, magnitude, &c. of the designed edifice. Mr. Gautier wishes, that mathematical persons would take the structure and proportions of bridges into their consideration, in order to bring things to more certainty and precision, founded on unvariable geometrical truth. Something of which kind has been attempted by M. de la Hire, in *Mem. Acad. R. Scienc. an.* 1712, p. 70, and the Marquis de l'Hospital, in *Act. Erud. Lips.* 1695, p. 56.

With regard to the theory of bridges, we shall endeavour to render it as clear as may be, by the solutions to the following problems.

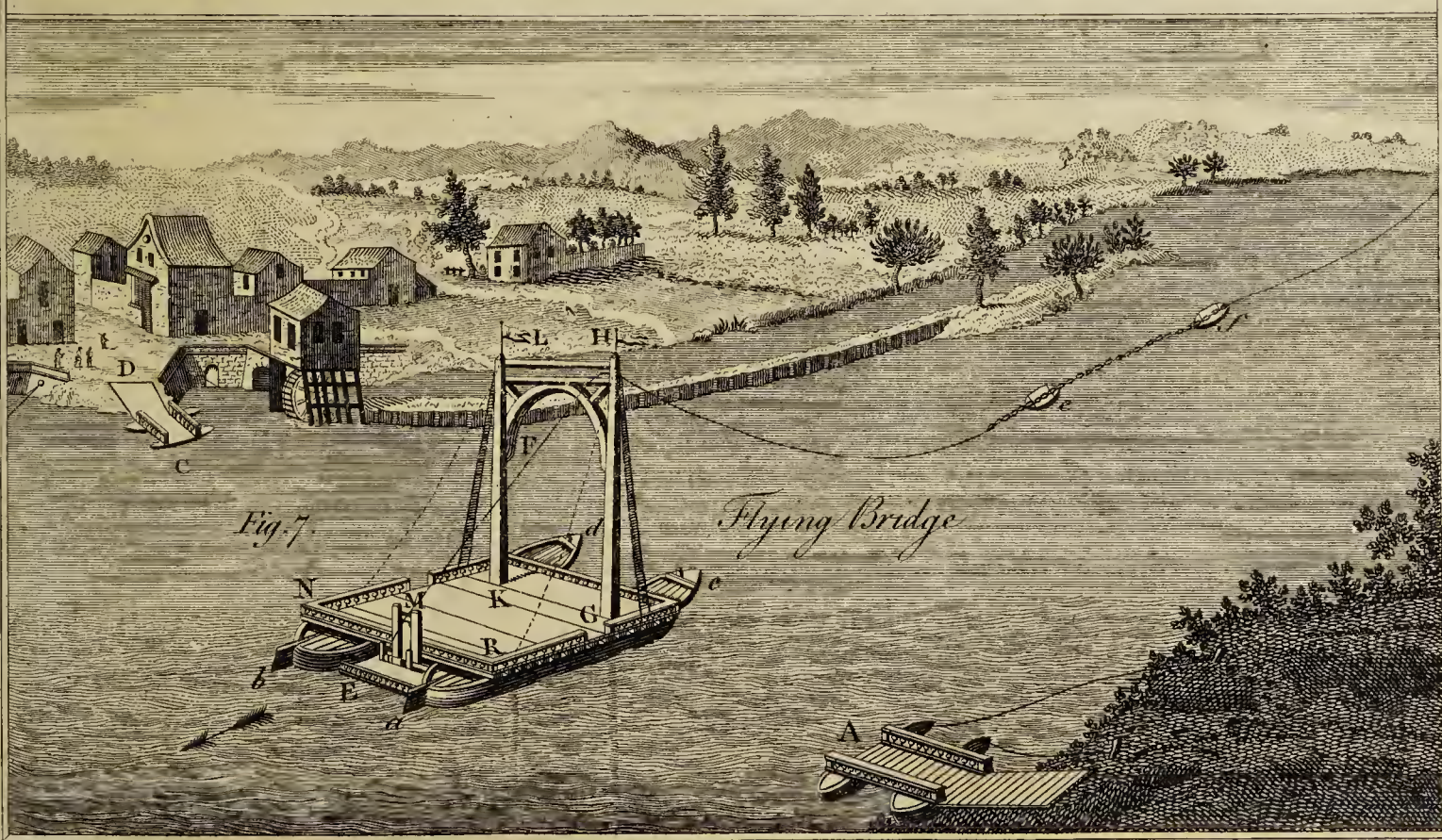
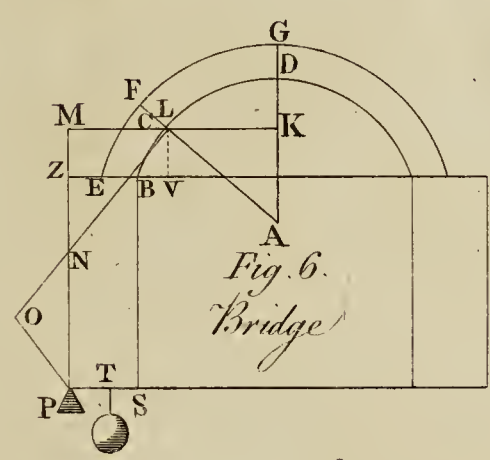
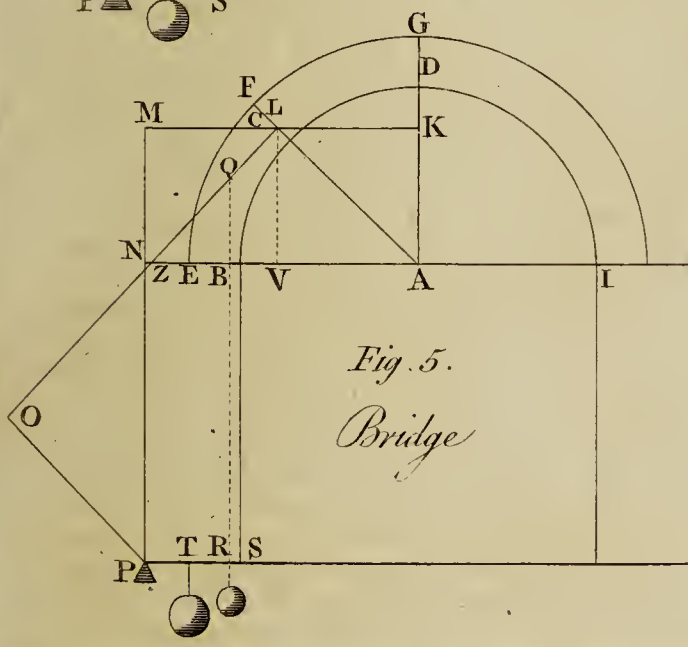
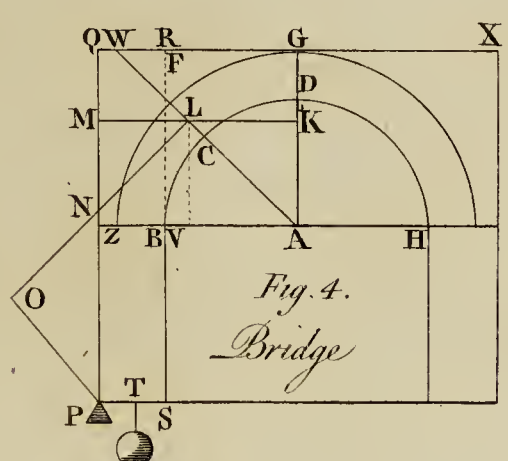
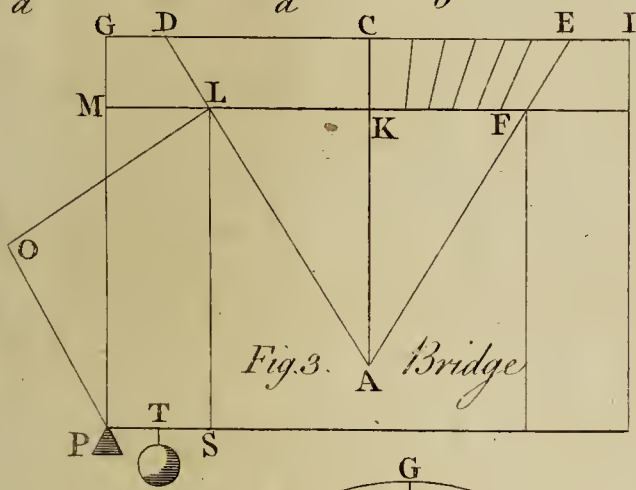
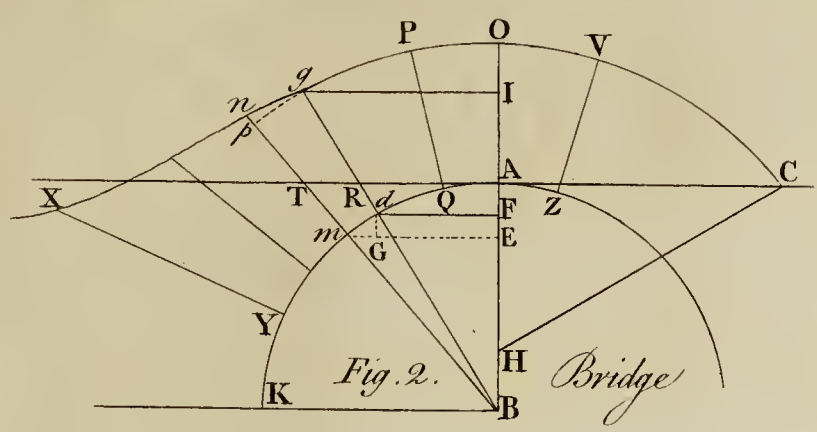
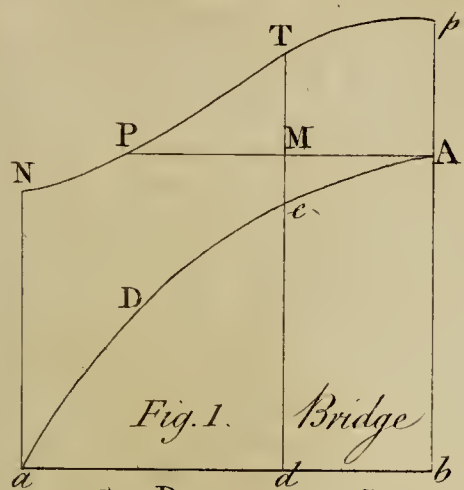
Let it, for instance, be required to find the nature of the extrados,  $V P X$ , (*Plate XII. fig. 2.*) of the proposed circular arch,  $A d Y$ , so that the several parts shall be in equilibrio, by the weights of the voussoirs only, without the help of any wall or counterfort, provided the abutments are of sufficient strength to bear the weight of the whole arch.

Let  $B$  be the centre of the circular arch,  $A d Y$ ,  $A B$  its vertical radius,  $B K$ , the horizontal one, at right-angles to each other; and suppose  $g d m n$ , (whose joints  $g d, m n$ , being produced, would pass through the centre  $B$ ) one of the voussoirs whose extrados  $g n$ , is required. Produce  $B A$  to  $O$ , so that the axis of the key stone,  $Q P V Z$ , may be of the given length. Draw an indefinite tangent, as  $C A T$ , to the point  $A$ , the vertex of the arch. From the points  $d, m$ , supposed indefinitely near each other; let fall the perpendiculars  $d F$ , and  $m E$ , upon  $A B$ , and also the perpendicular  $d G$  upon  $m E$ . On  $B$ , as a centre, with the radius  $B g$ , describe the arch  $g p$ , intersecting  $B m n$  in  $p$ . Let  $R$  and  $T$  be the points in which the joints  $B g$  and  $B n$  intersect the horizontal line  $A T$ . The angles  $F d B$ ,  $A R B$ , or  $A T B$ , are equal, because of the parallels  $A R$ ,  $F d$ , and the indefinitely small arch  $d m$ : at the same time, the angles  $F d G$ ,  $B d m$ , being right ones, the triangles  $B F d$ ,  $m G d$ , will be similar. Then as  $B F : B d :: m G : m d$ . And as  $B F : F d :: B A : A R$ . Whence, by a fluxionary equation,  $R T$  will be found. Draw the ordinate  $g I$  to the axis  $O B$ ; then will  $B I$  be a fourth proportional to  $B d$ ,  $B F$ ,  $B G = \sqrt{B O - A B^2 + B F^2}$ .

Take therefore the key-stone  $Q P V Z$  at pleasure, the lies  $V Z$ ,  $P Q$ , tending to the centre  $B$ . From  $A$  draw the horizontal line  $C A T$ , and from the centre  $B$ , with  $B O$ , as radius, describe the circular arch  $O C$ , meeting  $T A C$  in  $C$ ; take any point at pleasure as  $p$ , upon the intrados, and make  $A H$  equal to the perpendicular distance of  $d$  from the radius  $B K$ . Draw  $C H$ : make  $B I$  equal to  $H C$ ; and from  $I$  draw  $I g$ , meeting  $B d$  produced in  $g$ , which will be one point of the required extrados. In the same manner other points may be found, by which the extrados  $O g X$  may be determined.

If  $A D$  (*Plate XII. fig. 1.*) be a given arch, whose extrados











extrados is  $p$  T N, axis A  $b$ , femispan  $b a$ , and A  $p$ , the given height of the vertex of the required extrados from that of the arch; and from A, a right line A M P be drawn parallel to the horizontal line  $a b$ ; and also through any point M, a right line be drawn parallel to A  $b$ ; then will T  $e$  (A  $b a D e$  being the quadrant of a circle) the height of the extrados above the point  $e$  of the proposed arch, be inverfely as the cube of the right line  $e d$ ; but if A  $e a$ , be the arch of an ellipsis; then, having firft multiplied the fquare of  $e d$ , by the fquare of the femitransverfe diameter  $b a$ , and the fquare of the horizontal diftance A M, by the fquare of the femiconjugate diameter A  $b$ , and fubtracted one produét from the other, the height  $e T$ , of the required extrados, will be directly as the difference, and inverfely as the cube of  $e d$ .

Let it now be required to find the thicknefs of the piers neceffary to fustain the parts of the proposed femi-circular arch.

Let S Z (Plate XII. fig. 5) be one of the required piers of the femi-circular arch, whose half is represented by B E D G. Through L, the middle of F C, draw M K parallel to Z A, and produce P Z to M. Let fall L V perpendicular upon A B; and from L draw L O at right angles to L A, meeting the perpendicular P O in O. From Q, the centre of gravity of the vouffoir C E, let fall Q R perpendicular upon the bafe of the pier. Bifect P S in T; then will M N, or M L, be equal to B + V P S; and M P = K A + Z P; confequently N P = K A + Z P - B V - P S. And from an eafy equation, the force acting at right angles upon the arm P O of the blended lever R P O, whose centre of motion is P, will be readily found; and by the well known properties of the lever, the refpective forces acting upon the points T and R, in a direction perpendicular to the horizon, will be eafily difcovered.

When the extrados of the arch B D H (Plate XII. fig. 4.) is terminated by a horizontal line Q X; then having taken F C = D G, and drawn L O perpendicular to F C, in the middle point L as before, and the other particulars remaining ftill the fame; then by the fimilar triangles L K A, P O N, we have as L A : L K :: P N : P O. Now the abfolute weight of the vouffoir C W G D, is to the force thereof, acting in the direction L O, as L K to L A, by the nature of bodies refting on inclined planes; whence, by a fhort algebraical procefs, the neceffary thicknefs of the pier will be found.

Almoft in the fame manner may the thicknefs of the piers, neceffary to fustain in equilibrio the parts of a proposed femi-elliptical arch, be determined.

Let S Z (Plate XVI. fig. 6.) be one of the required piers, of the femi-elliptical arch, whose half is represented by B E G D. From the middle of the arch B D, draw L O, a tangent to that point, and erect the perpendicular L A, which produce to A. From L let fall P O, perpendicular upon L O; and through L, draw M L K parallel to the femi-transverfe axis B H. Then, by the fimilar triangles L K A, L M N, we have A K : K L : L M : M N; and hence we get N P. And again, by the fimilar triangles L K O, N O P, we get P O. Now the abfolute weight of the vouffoir, L F G D, is, to its preffure upon F L as K L to L A. On the other hand, an equation expreffing the refiftance of the pier S Z, may be eafily found, and confequently the problem folved.

If it be required to determine the thicknefs of the piers neceffary to fupport in equilibrio the proposed vouffoirs, when ranged in a right-line, or what workmen call a ftrait arch, we may proceed in the following manner:

Upon L F (Plate XII. fig. 3.) the given diftance between the piers, describe an equilateral triangle L A F; and divide its bafe L F, into as many equal parts as there are vouffoirs. From A, through thefe points of divifion, draw right-lines terminating in the points D C E, &c. in the indefinite right-line G I, drawn parallel to L C at fome given diftance. From L draw L O at right angles to A D, and from P, let fall P O perpendicular thereon. Produce K L to M, and draw A K C, perpendicular to L F. Then are

the triangles A K L, L M N, N O P, fimilar; and therefore R A : K L : L M : to M N; whence N P will be found. Again, A L : A K : N P : P O. The abfolute weight of L D C K, is to its force upon the pier S M, as S K to L A. But L A is double to L K; therefore the force acting upon O, in the direction L O, will be equal to twice the area of L D C K; which, multiplied by P O, gives the force acting upon P at the diftance P O, which, by the property of the lever, muft be equal to the force acting upon the point D, at the diftance of half P S.

*Rufhen* BRIDGES, are made of great bundles of rushes, bound faft together, over which planks are laid, and faftened: thefe are put over marfhy places, to ferve for a croffing ground.

*Pendent or hanging* BRIDGES, called alfo philofophical bridges, are thofe not fupported by pofts or pillars, but hung at large in the air, fufained only at the two ends or butments.

*Draw-BRIDGE*, one that is faftened with hinges at one end only, fo that the other may be drawn up; in which cafe, the bridge ftands upright, to hinder the paffage of a ditch or moat.

*Flying or floating* BRIDGE, is generally made of two fmall bridges, laid one over the other in fuch a manner, that the uppermoft ftretches and runs out, by help of certain cords, running through pullies placed along the fides of the under bridge, which push it forwards, till the end of it joins the place it is intended to be fixed on. See Plate XII. which represents a flying-bridge of this kind.

The upper compartment of the plate marked fig. 7. is a perspective view of the courfe of a river and its two banks.

*a, b, c, d*, two long boats or batteaux, which fupport the flying-bridge.

G H, K L, two masts joined at their tops by two tranfverfe pieces, or beams, and a central arch, and fupported in a vertical pofition by two pair of fhrowds, and two chains L N, H R.

M, a horfe, or crofs-piece over which the rope or cable M, F, *e, f*, that rides or holds the bridge againft the current, paffes.

E, a roll or windlaf round which the rope M, F, *e, f*, is wound.

*a, b*, the rudders.

A, and C D, two portions of bridges of boats faftened to the bank on each fide, and between which the flying bridge moves in paffing from one fide of the river to the other.

*e, f*, chains fupported by two punts, or fmall flat-bottomed boats: there are five or fix of thefe punts at about forty fathoms from one another. The firft, or furtheft from the bridge, is moored with anchors in the middle of the bed of the river.

BRIDGE, in gunnery, the two pieces of timber which go between the two tranfums of a gun-carriage, on which the bed refts.

BRIDGE, in mufick, a term for that part of a ftringed instrument, over which the ftrings are ftretched. The bridge of a violin is about one inch and a quarter high, and near an inch and a half long.

BRIDLE, in the manege, implies a contrivance made with ftraps or thongs of leather, and pieces of iron, in order to guide the motions of a horfe, and keep him in fubjection.

BRIDLES, in the marine, fignify the upper part of the moorings, by which the fhips of war ride in the harbours, when out of commiffion.

BRIDLES of the Bowlines, or Bowline-bridles, among feamen, are the fmall ropes faftened to the beeks of the fails, and united to the bow-lines, in order to draw the weather beek, or edge of the fail, forward, when the fhips fail near the wind.

BRIEF, in common law, implies a writ whereby a perfon is fummoned or attached to anfwer any action.

BRIEF alfo fignifies an abridgement of a client's caufe, wrote out for the inftruction of counfel, on a trial at law.

*Apoftolical* BRIEFS, are the writings or letters difpatched by the pope, to princes, &c. relative to publick affairs.

BRIG,



**BRIG**, or **BRIGANTINE**, among our English failors, implies a vessel with two masts, having a main-sail like a sloop, but the rest of the rigging like that of a ship.

**BRIGADE**, in military affairs, implies a party, or division of a body of soldiers, whether horse or foot, under the command of a brigadier.

**BRIGADE-MAJOR**, an officer appointed by the brigadier, to assist him in the management of his brigade.

**BRIGADIER**, a military officer, whose degree is the next above that of a colonel; appointed to command a corps, consisting of several regiments, called a brigade.

**BRIMSTONE**, in natural history, the same with sulphur. See the article **SULPHUR**.

**BRINE**, water fully impregnated with saline particles. See the article **SALT**.

**BRINGING-TO**, among seamen, implies the act of stopping a ship in her motion, by hauling the sails in such a manner, with regard to the wind, that their forces may counteract one another.

**BRISTOL-WATER**, these waters are the fourth in degree amongst the waters which are esteemed warm. The waters of Bath are the first, Buxton the second, and Matlock the third.

Bath waters are beneficial, when the secretions from the blood are diminished; Bristol, when too much increased: Bath attenuates powerfully; Bristol incrassates: Bath is spirituous, and helps defects; Bristol is more cooling, and suppresses plenitude, with its consequences, inflammations and hæmorrhages.

If we may judge of the contents of Bristol waters, from their effects, which are exceedingly detergent and healing, they partake chiefly of chalk, lapis calcarius, and calaminaris, the virtues of which are too dry to cleanse; they fill ulcers with flesh, and cicatrize them.

But whatever the substances are that impregnate them, it is plain they are very subtil, and that there is but little of a terrestrial part in them, from their specific lightness above other waters: yet when we consider how agreeable to the sight, smell, and taste; how clear, pure, and soft they are; their gentle degree of heat, so adapted to sundry diseases, it must be concluded, that those waters do imbibe some salutary particles in their passage through the earth, and from the many cures yearly wrought by them, that they have an undoubted title to a place in the first class of medicinal waters.

The diseases in which Bristol waters are properly prescribed, are internal hæmorrhages, and inflammations, blood-spitting, dysentery, and immoderate flux of the menses, purulent ulcers of the viscera: hence in consumptions, the dropsy, scurvy with heat, stone, gravel, strangury; the habitual gout, scorbutick rheumatism, diabetes, slow fevers, atrophy, venereal disease, cancer, gleets, in both sexes, king's evil, &c. in all these disorders, Bath waters are not only improper, but hurtful; they rouse the too languid, and quicken the too lazy circulation; they allay the heat, and restrain the too rapid motion of the blood. The former attemperate the choleric, and the latter impregnate the phlegmatick. In short, Bath water seems to be adapted to the maladies of the stomach, guts, and nerves; Bristol, to those of the lungs, kidneys, and bladder: again, Bath waters are at variance with a milk course; and the Bristol can never be judiciously directed, but when they may be joined with reason and success.

The Bristol-waters are taken medicinally only during the hot months, as from April to September.

**BRITAIN**, or **GREAT-BRITAIN**, the most considerable of all the European islands, lies between 50° and 60° north latitude, and between 2° east longitude, and 6° west longitude.

The general division of Britain, is into South and North Britain, or England and Scotland.

**BRITANNICA**, among ancient physicians, the name by which they called the great water-dock; a powerful astringent, which they prescribed in hæmorrhages, and other fluxes.

**BRIZE**, among husbandmen, implies ground that has lain long untilld

**BROACHING-TO**, among seamen, implies the art of bringing a ship's side to the windward, when she has been failing more before it.

**BROAD**, an epithet applied to magnitudes, whose breadth bears a considerable portion to their length.

**BROADSIDE**, in a sea fight, implies the discharge of all the artillery on one side of a ship of war.

**BROCADE**, a stuff of gold, silver or silk, raised and enriched with flowers, foliages, and other ornaments, according to the fancy of manufacturers.

**BROCOLI**, in gardening, the Italian name for a species of cabbage, and much cultivated in England for culinary uses.

There are two sorts of brocoli, distinguished by the epithets, purple and white: but both of them are propagated by sowing their seeds; the season for which is the latter end of May or beginning of June, on a bed of good earth, and kept well watered in dry weather. When the plants are got about three inches high, they should be transplanted into beds at about four inches asunder; here they may remain till the latter end of July or beginning of August, when (taking if possible the advantage of moist weather) they may be planted out where they are to remain, at the distance of three feet row from row, and two feet in the rows, and placed alternately. The soil in which they should be planted ought to be rich, rather light than heavy: towards the end of December, if the weather is not severe, they will begin to show their small heads, which, especially at their first appearance, are not unlike cauliflowers. These heads should be cut off before they run to seed, with about four or five inches of the stalk, and a great number of sprouts or side-shoots, produced from the stem, will succeed them, and continue fit for eating till April: though they are not so large as the former, yet they are equally as well tasted, if not superior in flavour.

In order to save good seeds of brocoli, there should be reserved a few of the largest heads to run up to seed, observing to strip off the side-shoots, leaving only the principal head to flower, with this precaution, not to let any other plant of the same genus be near them when in blossom, as the effluvia might occasion a degeneracy. If this practice is duly observed, the sort may be preserved in perfection many years, and the seed as good as those procured from abroad.

Another sort, called the brown or black brocoli, is by many greatly esteemed, but is much inferior, in respect to the palate, to the former; therefore, the only recommendation which can be given to it is, that it is much hardier, and will bear the severity of winter better; and is on that account a good substitute when the other sorts have failed. This sort will grow very tall, and therefore should have the earth drawn up to their stems, as they advance in height. This does not form heads so perfect as the Italian brocoli, the stems and hearts of the plants being the parts which are eaten.

**BROCK**, among sportsmen, is a name sometimes given to a badger. They also call a hart of the third year a brock or brocket.

**BROKEN-BACKED**, amongst seamen, a ship is said to be so, when either by age or some great strain she is so weakened in the keel and midship frame as to droop at both ends.

**BROKEN wind**, among farriers, is a malady that happens to a horse when he is suffered to stand too long in the stable, without exercise: By this means he contracts gross and thick humours in such abundance, that, adhering to the hollow parts of his lungs, they stop his wind-pipe.

This distemper is known by the horse's heaving and drawing up his flanks together, and blowing wide his nostrils.

To cure this disorder, take the guts of a hedge-hog, dry them, and pound them to powder, and give the horse two or three spoonfuls of it in a pint of wine or strong ale; then mix the rest with anise-seed, liquorice, and sweet butter, of which make round balls, or pills, and give him two or three of them after drink, and let him fast two or three hours.

**BROKER**, a name given to persons of several and very different professions, the chief of which are exchange-



change-brokers, stock-brokers, pawn-brokers, and brokers, simply so called, who sell household-furniture, and second-hand apparel.

*Exchange-BROKERS* are a kind of agents, or negotiators, who contrive, propose, and conclude bargains between merchants, and between merchants and tradesmen, in matters of bills of exchange, or merchandise, for which they have so much commission. These, by the statute of 8 and 9 William III. are to be licensed in London by the Lord Mayor, who gives them an oath, and takes bond for the faithful execution of their offices. If any person shall act as broker, without being thus licensed and admitted, he shall forfeit the sum of 500*l.* and persons employing him 5*l.* and brokers are to register contracts, &c. under the like penalty: also brokers shall not deal for themselves, on pain of forfeiting 200*l.* They are to carry about with them a silver medal, having the king's arms, and the arms of the city, and pay 40*s.* a year to the chamber of the city.

The exchange brokers make it their business to know the alteration of the course of exchange, to inform merchants how it goes, and to give notice to those who have money to receive or pay beyond sea; they are the proper persons for negotiating the exchange, and when the matter is accomplished, that is, when the money for the bill is paid, and the bill delivered, they have for brokerage 2*s.* for 100*l.* sterling.

They reckon at Paris, among the city-officers, who are employed under the jurisdiction of the provost of the merchants, and *chevins* or aldermen, three sorts of brokers.

1. The brokers of horses for the carriage of merchandise by water; they are established for the navigation, and take care to examine the horses used to draw the boats up the river; to set the horses together, to oblige the carriers to repair their boats, or to break such as are no longer fit to serve.

2. Sworn wine-brokers on the keys, to examine and taste all wines that arrive there.

3. Brokers of bacon and lard. These are established to examine those sorts of merchandises, as they are landed or unloaded, and to answer for their goodness to the buyer, and to the seller, for the price of his wares.

*Stock-BROKERS*, are those who are employed to buy and sell shares in the joint stock of a company, or corporation.

As the practice of stock-jobbing has been carried on to such an excess as became not only ruinous to a great number of private families, but even affected, or at least might soon affect, the publick credit of the nation, the legislature thought fit to put a stop to it, or at least to bring it within certain bounds, and under some regulation, by statute 7 George II. c. viii. sect. 1.

*Pawn-BROKERS*. Persons who keep shops, and lend money upon pledges to necessitous persons, and most commonly at an exorbitant interest. They are more properly styled pawn-takers, or tally-men, sometimes fripers or friperers. These are meant in 1 Jac. I. cap. xxi. sect. 5. where it is declared, that the sale of goods wrongfully taken to any broker, or pawn-broker in London, Westminster, Southwark, or within two miles of London, does not alter the property.

And sect. 7. If a broker, having received such goods, shall not, upon request of the owner, discover them, how and when he came by them, and to whom they are conveyed, he shall forfeit the double value thereof, to be recovered by action of debt, &c.

In the cities of Italy, there are companies established by authority for the letting out money on pawns, called *mounts of piety*; a title little becoming such institutions, as the loan is not gratis. In some parts of Italy, they have also mounts of piety of another kind, wherein they only receive ready money, and return it again with interest, at a certain sum *per annum*.

At Bologna, they have several such mounts, which are distinguished into frank and perpetual; the interest of the former is only four *per cent.* that of the latter, seven.

*BROKERS* are also those who sell old household-furniture, and wearing apparel, &c.

*BROMELIA*, or pine-apple, in botany, a genus of the hexandria monogynia class. The calix is divided into three segments; it has three petals, and there is a scaly nectarium at the base of each petal; the berry has three cells. There are five species of bromelia, *viz.* the ananas or common pine-apple, which is a native of Surinam and New Spain; the pinguin, a native of Jamaica and Barbadoes; the karatos, *lingulata*, and *nudicaulis*, all natives of the southern parts of America.

*BRONCHIA*, in anatomy, the ramifications of the trachea.

*BRONCHOCELE*, in surgery, a tumour arising in the anterior part of the neck.

*BRONCHOTOMY*, in surgery, an incision made in the aspera arteria, or wind-pipe, which is necessary in many cases, and especially in a violent quinsy, to prevent suffocation from the great inflammation or tumour of the parts. It is also called laryngotomy and tracheotomy.

*BRONCHUS*, according to Galen, is the aspera arteria which reaches from the larynx to the lungs, consisting of the bronchia. Sometimes it is put for the whole aspera arteria; and Hippocrates uses it to signify the throat.

*BRONTIÆ*, or THUNDER STONES, in natural history. See *BELEMNITES*.

*BRONTIUM*, in Grecian antiquity, a place underneath the floor of the theatres, in which were kept brazen vessels full of stones and other materials, with which they imitated the noise of thunder.

*BRONTOLOGY* denotes the doctrine of thunder, or an explanation of its causes, phenomena, &c. together with the presages drawn from it. See the article THUNDER.

*BRONZE*, a compound metal, consisting of one part of tin, ten of copper, and a little zinck.

*BRONZING*, the art of varnishing wood, plaster, ivory, &c. so as to give them the colour of bronze.

*BROOK*, a little river, or small current of water.

A brook is distinguished from a river, inasmuch as a river flows at all times, whereas a brook flows at some particular seasons only.

*BROOK-LIME*, in botany, the English name of the water anagallis. Brook-lime is moderately hot and moist, and said to be good for cleansing the blood; and, consequently, recommended against the scurvy, dropfy, and stone.

*BROOM*, *genista*, in botany. Many gather the yellow buds of this plant, and pickle them with salt and vinegar, in the same manner as capers, from which they are not then to be distinguished; the flowers are most in use, and are accounted splenetick, nephretick, and hepatick.

Broom is extremely pernicious to arable and pasture lands; and therefore ought, by all means, to be rooted up, which is the only method of killing it. On barren grounds, indeed, it is a good improvement; for besides its use as fuel, it makes an excellent and lasting thatch, if well laid on.

*Butcher's-BROOM*, the English name of a genus of plants, called by botanists *ruscus*.

*Spanish-BROOM*, in botany, the *spartium* of authors. See the article *SPARTIUM*.

This is an excellent beautiful shrub, which sometimes grows to an incredible height.

*BROOM-FLOWER*, *ordre de la geniste*, an order instituted by St. Louis, king of France, to shew the esteem which he had for the queen his wife, who, the evening before his queen's coronation, received this order himself.

*BROOM-LIME*, in botany, the *veronica* of authors. See the article *VERONICA*.

*BROOM-RAPE*, in botany, the *orobanche* of botanists. See the article *OROBANCHE*.

*BROOMING*, or *BREAMING of a ship*. See the article *BREAMING*, and *CAREENING*.

*BROTHER*, a term of relation between male children, sprung from the same parents, or from the same father, or the same mother.

The ancients used the term brother, indifferently, to almost all who stood related in the collateral line, as uncles and nephews, first cousins, &c.



According to the laws of Moses, the brother of a man who died without children, was obliged to marry the widow of the deceased, in order to raise up children to him, that his name might not be extinct. See the article WIDOW.

Among us, it is customary for kings to give the title brother to each other.

In the civil law, brothers, *fratres*, in the plural number, sometimes comprehends sisters.

BROTHER is also a customary term for priests of the same persuasion to address one another by; but it is more particularly used to denote the relation between monks of the same convent, as brother Zachary: in English, we more usually say, friar Zachary, from the French word *frere*, brother. Preachers also call their hearers, my brethren, or my dear brethren; and sometimes they use the singular number, and say, my brother.

This appellation is borrowed from the primitive Christians, who all called each other brothers: but it is now principally used for such of the religious as are not priests; those in orders are generally honoured with the title of father, whereas the rest are only simply brothers.

BROW, or EYE-BROW, the hairy arch extended over the orbit of each eye.

BROW-ANTLER, among sportsmen, implies that branch of a deer's horn which is next his head.

BROW-POST, among carpenters, signifies the beam that extends across a building.

BROWALLIA, in botany, a genus of the didynamia angiospermia class. The calix has five teeth; the limbus of the corolla is divided into five equal and open segments; and the capsule is unilocular.

BROWN, among dyers, painters, &c. a dusky colour, inclining towards redness. Of this colour there are various shades or degrees, distinguished by different appellations; for instance, Spanish-brown, a sad-brown, a tawny-brown, the London-brown, a clove-brown, &c. Spanish-brown is a dark dull red, of a horse-flesh colour. It is an earth, and is of great use among painters, being generally used as the first and priming colour that they lay upon any kind of timber-work in house-painting. That which is of the deepest colour, and freest from stones, is the best.

BROWNISTS, in church history, is the name of a religious sect that followed the errors of one George Brown, a native of Northampton, who lived about the end of the sixteenth century. This sect rejected all forms of prayer, and condemned every form of religious worship except their own.

BRUISE, in surgery, the same with contusion. See the article CONTUSION.

BRUMALIA, in antiquity, certain Bacchanalian festivals celebrated by the old Romans. They were instituted by Romulus, and continued till the destruction of their empire.

BRUNFELSIA, in botany, a genus of plants belonging to the pentandria-monogynia class; the flower of which consists of a single petal, of a funnel form; the fruit is a globose berry, with one cell containing numerous roundish seeds, placed close to the integument of the berry.

BRUTE, an animal guided mostly by mere instinct, and comprehends all animals, excepting mankind.

BRYONY, *bryonia*, in botany, a genus of the monoecia-syngenesia class of plants; the flower of which consists of a single petal, divided into five deep segments; the fruit is of a roundish berry, containing a few seeds, for the most part of an oval figure. The expressed juice of the root of this plant, being of a bitter, acrid, and nauseous taste, is an attenuant and resolvent. It powerfully dissolves viscid humours, and carries them off by stool, and sometimes by vomiting; but it is a rough medicine, and must be given with great caution. It is given with success in dropsies, asthma, hysteric complaints, and even in palsies, and epilepsies.

It is much the more powerful in all these intentions, when fresh; but it should be corrected with an addition of cream of tartar, vinegar, or some aromatics.

Black-BRYONY, *bryonia nigra*, a name sometimes given to the tamnus.

Indian-BRYONY or Peruvian-BRYONY, names given to several species of jalap.

Wild-BRYONY, *Bryonia cretica*, a term used, by some of the ancients, for the chamæpitys of modern botanists.

BUBBLE, in philosophy, small drops or vesicles of any fluid filled with air, and either formed on its surface, by an addition of more of the fluid, as in raining, &c. or in its substance, by an intestine motion of its component particles. Bubbles are dilatable or compressible, i. e. they take up more or less room, as the included air is more or less heated, or more or less pressed from without, and are round, because the included air acts equally from within, all around.

BUBBLE, in commerce, a cant term given to a kind of project for raising of money on imaginary grounds, much practised in France and England in the years 1719, 1720, and 1721.

BUBO, in surgery, a tumour arising from an inflammation in certain parts of the body, as the groin and arm-pits. See the article TUMOUR.

BUBON, in botany, a genus of the pentandria digynia class. The fruit is oval, striated, and hairy. There are four species, and none of them natives of Britain.

BUBONOCELE, or HERNIA INGUINALIS, in surgery, a tumour in the inguen, formed by a prolapsus of the intestines, omentum, or both, through the processes of the peritonæum, and rings of the abdominal muscles. See RUPTURE and HERNIA.

BUCCAL, *buccalis*, something belonging to the cheeks: thus the buccal glands, are those dispersed over the inner side of the cheeks.

BUCCANEERS, a name given originally to the French inhabitants of St. Domingo, in the West Indies, from their smoking the flesh or fish used for provisions, in the manner of the savages, in a place called Buccan. And hence all those who dry or smoke flesh or fish in this manner are called Buccaneers.

The name has also been applied to those famous adventurers, consisting of pirates, &c. from all the maritime nations of Europe, who formerly joined together, and made war with the Spaniards in America.

BUCCINA, a famous musical instrument among the ancients; supposed to have been a species of trumpet.

BUCCINATOR, a muscle on each side of the face, common to the cheeks and lips. See MUSCLES of the human body.

BUCCINUM, the trumpet-shell, a genus of shells, resembling, in some measure, a horn, or other wind instrument.

BUCHNERA, in botany, a genus of plants, whose flower consists of a monophyllous calyx, divided into five parts, which is persistent: the corolla is monopetalous, with five equal and obversely cordated segments at its edge, containing four short filaments, topped with oblong antheræ: the fruit is an ovato-oblong capsule, with two cells divided at the top, containing numerous angulated seeds.

BUCIDA, in botany, a genus of decandrious plants, whose flower is apetalous; the calyx is monophyllous and campanulated, cut into five segments, and persistent; the fruit is a dry ovated berry, with one cell, containing an egg-shaped single seed.

BUCK, among sportsmen, a well known animal, generally kept in parks. In the first year he is called a fawn; in the second, a pricket; in the third, a sorrel; in the fourth, a fore; in the fifth, a buck of the first head; and in the sixth, a great buck.

BUCK-BEAN, or MARSH-TREFOIL, *trifolium palustre*, a plant with large oval leaves, pointed at each end like those of the garden beans. It is perennial, grows wild in marshy places, and flowers in May. Sheep, when found and in health, always avoid eating buck-bean; but when the symptoms of the rot begin to attack them, they search for it by instinct, and devour it greedily. Where such sheep are pastured, no buck-bean is to be found; for in a week or two they devour it all. Might it not be prudent, therefore, in husbandmen,



husbandmen, who graze large flocks, to cultivate an acre of this plant in some morassy ground; which otherwise would not yield them two shillings the acre? Some might be cut up green, for unsound sheep, and given them with lucern, as occasion requires; and some might be made into hay, and mixed with their fodder. I cannot remember that this advice has been given by any husbandry writer.

**BUCK-THORN**, *Rhamnus*, a hedge tree, or bush, whose branches are full of long stiff thorns, and yellowish green leaves about as big as the sloe-tree, but more neatly serrated about the edges. The flowers grow several together, being small, four-leaved, and yellow, which are succeeded by little round black berries, yielding, when ripe, a purplish bitter juice, and having three or four angular seeds. It grows in woods and hedges, and flowers in June, the berries being ripe about the latter end of September.

The juice of the berries purges serous watery humours pretty briskly; and is good against the dropsy, gout, jaundice, and scurvy, and very serviceable against the itch, and all manner of eruptions on the skin.

The berries of this tree are ordered by the college of physicians for medicinal use; but particularly for making a syrup, which was formerly in great use; but of late the persons who supply the markets, have gathered several other sorts of berries, which they have either mixed with those of the buckthorn, or have wholly substituted them in their place. These are the berries of the frangula, cornus scemina, &c. which mixture have spoiled the syrup, and rendered it less esteemed. But whoever purchases the buck-thorn berries, may distinguish whether they are right or not, by opening them, and observing the number of seeds in each; for these have commonly four, whereas the frangula has but two, and the cornus scemina but one; as also by bruising of the berries on white paper, the juice giving a green tincture.

**BUCK-WHEAT**, the English name of the fago pyrum of authors; it is cultivated in many parts of England, and is a great improvement to dry barren lands. The best season for sowing the seed is in May: one bushel will sow an acre. The ground should be plowed and dressed in the same manner as for barley; and, if the soil is not very lean, it will yield a very great increase, as fifty or sixty bushels upon an acre, and is excellent food for hogs, poultry, &c. The flour of it is very white, and makes a very good sort of pancake, if mixed with a little wheat flour. The straw is good fodder for cattle; and the grain, given to horses among their oats, will make them thrive; but it must be broken in a mill; otherwise it is apt to pass through the cattle whole.

It is commonly late in the season before it is ripe; but there is no great danger of the seeds failing, nor of suffering by wet after it is mown: it must lie several days to dry, that the stalks, which are hard, may wither before it is housed.

Buck-wheat is sometimes sown very thick, and suffered to grow until it is near flowering, and is then plowed in, which makes a very good lay for wheat or rye: but some people esteem it the better way to feed cattle with it, especially milch-cows, which they say will cause them to give a great deal of milk, and make both the butter and cheese very good. This will also afford food for cattle in the driest time, when all other grass is burned up.

**BUCKING**, among bleachers, the first operation in the whitening of linen-yarn or cloth; it consists in pouring hot water, strongly impregnated with pot-ash, on the cloth or yarn placed in a tub for that purpose.

**BUCKLER**, a piece of defensive armour used by the ancients, and worn on the left arm.

**BUCKRAM**, in commerce, a sort of coarse cloth, dyed of several colours, and afterwards gummed and calendered.

**BUCOLICK**, in ancient poetry, a kind of poem relating to shepherds and country affairs, which, according to the most generally received opinion, took its rise in Sicily. Bucolicks, says Vossius, have some conformity with comedy. Like it, they are pictures and

imitations of ordinary life; with this difference, however, that comedy represents the manners of the inhabitants of cities, and bucolicks the occupations of country people. Sometimes, continues he, this last poem is in form of a monologue, and sometimes of a dialogue. Sometimes there is action in it, and sometimes only narration; and sometimes it is composed both of action and narration. The hexameter verse is the most proper for bucolicks in the Greek and Latin tongues. Moschus, Bion, Theocritus, and Virgil, are the most renowned of the ancient bucolick poets.

For the nature of this kind of poem, and the style and subjects which it requires, see the article **PASTORALS**.

**BUD**, among gardeners, that part of a seed which first begins to sprout, or rather the leaves first put forth: these in some plants are two; in others, four; and in others again, six, or even more.

**BUD**, is also used for the sprout from whence a branch arises.

**BUD**, in country affairs, likewise denotes a weaned calf of the first year; so called, because the horns are then in the bud.

**BUDDLE**, in mineralogy, a large square frame of boards used in washing ores.

**BUDDLING**, the operation of washing ores, by means of a buddle.

**BUDDLING-DISH**, a small, shallow, narrow vessel, used in washing ores by the hand.

**BUDGE-BARRELS**, in gunnery, an utensil for carrying powder. It consists of a barrel well hooped, but having only one head, there being nailed on the other end a piece of leather, which draws together like a purse by means of strings.

**BUFF**, in commerce, a sort of leather prepared from the skin of the Buffalo, which, dressed with oil, after the manner of shammy, makes what we call buff-skin. This makes a very considerable article in the French, English, and Dutch commerce at Constantinople, Smyrna, and all along the coast of Africa. The skins of elks, oxen, and other-like animals, when prepared after the same manner as that of the buffalo, are likewise called buffs.

There are several manufactories in France designed for dressing those sort of hides, particularly at Corbeil, near Paris, at Lyons, at Niort, at Roan, at Etanepus, and at Cone.

**BUFFALO**, *bulbalus*, in zoology, an animal common in the East, of the ox kind, with very large, crooked, and resupinated horns.

**BUFFET**, a small part of a room, separated from the rest by slender pillars, glass-doors, &c. for china.

**BUFONITÆ**, in natural-history, a kind of extraneous fossils, otherwise called lycodontes, or wolf's teeth. See the article **LYCODONTES**.

**BUG**, or **BUGG**, in zoology, the English name of a genus of insects, called by authors cimices. See the article **CIMEX**.

The house bug, or cimex lectularius, so extremely troublesome about beds, is of a roundish figure, and of a dark cinnamon colour.

In order to destroy these vermin, let the bedsteads be washed with oil of turpentine, or painted over with verdegrease ground in linseed and oil of turpentine. Or, boil wormwood, rue, common oil, and water together, till the water is consumed; then, after straining, make it into an ointment with a good quantity of grease or sulphur: with this rub the chinks and other places, where the bugs are supposed to be. Or, mix hemp, oil, and ox-gall together; with which rub the bedstead all over, and the bugs will not come near it. Or, pound equal quantities of black soap and common soap together; then mixing as much of quicksilver with it, let the buggy places be rubbed with this mixture.

**BUGLOSS**, *buglossum*, in the materia medica, a rough plant, greatly resembling borage, and differing from it chiefly in the leaves being narrow, less prickly, not wrinkled, and in colour a bluish green; and in the segments of the flowers being obtuse. It grows wild in waste gardens, flowers from June to the end of summer; and in winter dies to the ground, the roots abiding.



This plant appears to be nearly similar to borage, in its medicinal qualities as well as in its external form. The principal difference seems to consist in the leaves being somewhat less juicy, and the roots more mucilaginous. The roots, leaves, and flowers, are ranked among the articles of the materia medica, but are very rarely made use of.

**VIPER'S BUGLOSS**, *Echium*, in botany, a genus of the pentandria monogynia class. The corolla is irregular, with a naked faux. There are seven species, three of which are natives of Britain, viz. the vulgare, or viper's bugloss; the Anglicum, or English viper's bugloss; and the Italicum, or wall-viper's bugloss.

**BUGULA**, **BUGLE**, in botany, the same with the ajuga of Linnæus: it belongs to the didynamia-gymnospermia class of plants: the flower is monopetalous and ringent; the upper lip being small, and bifid; the lower one, large and trifid: there is no pericarpium: the seeds are contained in the cup of the flower, and are four in number.

The flowers and leaves of bugle are said to be good in fluxes, in retention of urine, and in hernias.

**BUILDING**, a fabrick erected by art, either for devotion, magnificence, or conveniency.

*Regular BUILDING*, is that whose plan is square, the opposite sides equal, and the parts disposed with symmetry.

*Irregular BUILDING*, that whose plan is not contained with in equal, or parallel lines, either by the accident of situation, or the design of the builder, and whose parts are not relative to one another in the elevation.

*Insulated BUILDING*, that which is not contiguous to any other, but is encompassed with streets, open squares, or the like.

*Engaged BUILDING*, one surrounded with other buildings, having no front to any street or publick place, nor any communication without, but by a common passage.

*Interred or sunk BUILDING*, one whose area is below the surface of the place on which it stands, and of which the lowest courses of stone are concealed.

With respect to their use, buildings take several denominations, as publick buildings, private buildings, hydraulick buildings, &c.

**BUILDING** is also used to signify the art of constructing and raising an edifice; in which sense it comprehends the expences, as well as the invention and execution of the design.

Three things are chiefly necessary to be considered in the art of building, namely, conveniency, firmness, and pleasure; and these Sir Henry Wotton considers under two heads, the situation, and the work.

As to the situation, either that of the whole is to be considered, or that of its parts. In the first, regard must be had to the quality, temperature, and salubrity of the air; to the quality of the soil; to the conveniency of water, fuel, carriage, &c. and to the agreeableness of the prospect.

As to the situation of the parts, the chief rooms, studies, and libraries, should lie towards the East; those offices which require heat, as kitchens, brew-houses, bake-houses, distilleries, towards the South; those that require a cool, fresh air, as cellars, pantries, and granaries, to the North; as also galleries for paintings, museums, &c. which require a steady light.

The ancient Greeks and Romans generally situated the fronts of their houses towards the South; but the modern Italians vary very much from this rule. And indeed it is absolutely necessary to have regard to the country, each being obliged to provide against its own inconveniencies.

The situation being fixed on, the next thing to be considered is the work itself, under which come first the principal parts, and next the accessories or ornaments. To the principal parts belong the materials, and the form or disposition.

As for the materials they are either stone, brick, mortar, &c. or wood, as fir, cypress; cedar for pillars for upright uses; oak for summers, beams, and cross work, or for joining and connection.

As to the form and disposition of a building, it is either simple or mixed.

The simple forms are either circular or angular. The circular form is very commodious; and the most capacious of any, strong, durable, and very beautiful; but is the most chargeable of all others, and much room is lost by the bending of the walls, when it comes to be divided into apartments; besides an ill distribution of the light, unless it be from the centre of the roof. For these reasons, the ancients employed this form only in their temples and amphitheatres, which had no need of compartitions.

As for angular forms, building neither loves many nor few angles. The triangle is condemned above all others, as wanting both capaciousness and firmness, as also on account of its not being resolvable, in the internal partitions, into any other figure than its own. Buildings with five, six, or more angles, are more fit for fortifications than civil edifices. The rectangle, therefore is generally chosen, as being a medium between the triangle and the pentagon, &c. But then authors are in dispute, whether the rectangle should be an exact square, or an oblong; and Sir H. Wotton prefers the oblong, provided the length exceeds not the breadth by more than one third. As to mixed forms, partly circular, and partly angular a judgment may be made of them, from what has been already said of simple ones. Let the builder, however, remember not to lose sight of uniformity, while he is in pursuit of variety; for these two may be very well reconciled, as may be observed in our bodies, which are uniform in the whole configuration; and yet some of the members are round, others flat; some prominent, and others indented, or retired.

Some observe, that in building houses long, the use of some rooms will be lost; as they will take up more for entries and passages, and will require too much for doors; and if the building be a geometrical square, the middle rooms will want light, in case the house be pretty large; and therefore they recommend the form of the letter H, a form, say they, in which the building stands firmer against the weather, and in which the offices may be remote from the parlour and rooms of entertainment, and yet in the same house.

This figure may serve very well for a country gentleman's house.

The principal parts of a building are comprized, by Baptista Alberti, under five heads, viz. the foundation, the walls, the apertures, the compartitions, and the covering; see each under its proper article, as **FOUNDATION**, &c.

The accessories or ornaments of a building are fetched from sculpture and painting. In the first, care ought to be taken that there be not too much of it, especially at the entrance; and that both in fine and coarse pieces of sculpture, and likewise in placing figures aloft, the rules of perspective be strictly observed.

In painting, the chief things to be regarded are, that the best pieces be placed in the best lights; and that they be suited to the intention of the rooms they are used in.

If we compare the modern with the old way of building in England, we cannot but wonder at the genius of those times. Our fore-fathers were wont to dwell in houses, most of them with a blind stair-case, low ceilings, and dark windows; the rooms built at random, without any contrivance, and often with steps from one to another: whereas the genius of our times requires light stair-cases, fine sash-windows; and lofty ceilings, with conveniencies far superior to those that houses in ancient days afforded upon an equal quantity of ground.

**BUL**, in the ancient Hebrew chronology, is the eighth month of the ecclesiastical, and the second of the civil year.

**BULB**, or **BULBOUS ROOT**, among botanists, is a root of a spheroidal form, composed of several skins or coats, investing one another; and sending from its lower parts a great number of fibres. The roots of onions, daffodils, &c. are bulbs.

**BULGARIANS**, a set of hereticks who rejected the Old Testament entirely, and held that unpotted chastity was necessary to salvation.

**BULIMY**,



**BULIMY**, *Bulimus*, among physicians, implies an inordinate desire of food, at very short intervals.

It arises from some vicious and acrid humour stimulating the coats of the stomach, and a want of nourishment from too quick a digestion.

**BULK** of a *Ship* implies the whole cargo stowed in the hold.

**BULK-HEADS**, certain partitions built up in different places of a ship, in order to form the various apartments.

**BULL**, *Taurus*, in natural history, the male of the ox kind. See the article *Ox*.

The bull, kept for propagating the species, should have a quick countenance, his forehead broad and curled, his eyes black and large, his horns large, short, and black, his neck fleshy, his belly long and large, his hair smooth like velvet, his breast big, his back straight and flat, his buttocks square, his thighs round, his legs straight, and his joints short; this sort of bull is the best for breed, and makes the best ox for draught.

**BULL**, *Taurus* in astronomy; see *TAURUS*.

**BULL**, among ecclesiastical writers, implies a written letter, dispatched by order of the pope, from the Roman chancery, and sealed with lead. It is written on parchment, by which it is distinguished from a brief.

**Golden BULL**, an edict or imperial constitution, made by the emperor Charles IV. and esteemed as the *Magna Charta*, or fundamental law of the German empire.

It is dignified with the epithet golden, from its having a golden seal appended to it with cords of red and yellow silk. On one side of this seal the emperor is represented sitting on his throne, and on the other the capitol of Rome. The original of this edict, which is in Latin, and written on vellum, is preserved at Franckfort.

**BULL'S-EYE**, in astronomy; see *ALDEBARAN*.

**BULL'S-EYE**, amongst seamen, a piece of wood hollowed like a large ring, having the end of a rope spliced round the outer-edge of it, and another passing through the middle of it. Its use is to prevent the running rope from being chafed or fretted by the other, which confines it in a certain situation required.

**BULL-FINCH**, in ornithology, the English name of the *loxia* with a black head, and red breast. It is about the size of a common sparrow; and its wings are elegantly variegated with black and red.

**BULL-FROG**, the largest kind of frog.

**BULLET**, an iron or leaden ball, wherewith firearms are loaded.

It is demonstrated in the elements of geometry, that similar solids are to each other, as the cubes of their homologous, or correspondent sides or diameters: bullets are similar solids, and therefore they are to one another as the cubes of their diameters. If we suppose the weight and diameter of a bullet to be known by experiment; for example, if it is found that a bullet of four pounds weight is three inches in diameter, the weight of any bullet may be easily found, if its diameter be given, and the diameter of any bullet, if the weight be given.

Let it be supposed, for instance, that the weight of a bullet of five inches diameter, is required; this will be found by the Rule of Three, by saying, As the cube of 3, which is 27, is to the cube of 5, which is 125, so is four pounds to the fourth term, or the weight required; or  $27:125::4$ : the fourth term, which will appear to be eighteen pounds and a half, the weight of a bullet of five inches diameter: by the same rule the diameter of bullets may be found, whose weights are given; for the Rule of Three having produced the fourth term, or the cube of the diameter required, the diameter sought will appear, by extracting the cube root from it.

Bullets are of various kinds, viz. red-hot bullets, made hot in a forge, intended to set fire to places where combustible matters are found. Hollow bullets, or shells made cylindrical, with an aperture and fusee at one end, which giving fire to the inside, when in the ground, it bursts, and has the same effect with a mine. Chain-bullets, which consists of two balls joined by a chain, three or four feet apart. Branch-bullets, two balls, joined by a bar of iron, five or six inches apart. Two-headed bullets, called also angles, two halves of a bullet, joined by a bar or chain.

VOL. I. No. 14.

**BULLION**, uncoined gold or silver in the mass.

Those metals are called bullion, both before and after they are refined, when melted down in bars or ingots, or in any unwrought body.

**BULTEL**, a term used by millers to denote the refuse of meal after dressing.

**BULWARK**, in ancient fortification, the same with which the moderns call rampart. See *RAMPART*.

**BUNIUM**, earth-nut, in botany, a genus of plants whose flower consists of five inflexo-cordated equal petals. It has no pericarpium: the fruit is oval, and divisible into two parts: the seeds are two, and of an oval form, convex on one side, and plane on the other.

**BUNT**, in naval affairs, the middle part of any square sail, from top to bottom; and hence,

**BUNTLINES**, ropes to draw up the bottom of the sail to the yard: they are inserted through certain blocks or pulleys on the upper part of the yard, and passing down on the fore-part of the sail, are there fastened to the bolt-rope, or rather to a sort of half-ring, or cringle, formed by one division of a rope twisted through the bolt-rope round itself till it becomes threefold.

**BUOY**, at sea, a short piece of wood, or a close-hooped barrel, fastened so as to float directly over the anchor, that the men, who go in the boat to weigh the anchor, may know where it lies.

**BUOY** is also a piece of wood, or cork, sometimes an empty cask, well closed, swimming on the surface of the water, and fastened, by a chain or cord, to a large stone, piece of broken cannon, or the like, serving to mark the dangerous places near a coast, as rocks, shoals, wrecks of vessels, anchors, &c.

There are sometimes, instead of buoys, pieces of wood placed in form of masts, in conspicuous places; and sometimes large trees are planted in a particular manner, in number two at least, to be taken in a right line, the one hiding the other, so as the two may appear to the eye no more than one.

*Stream the BUOY*, is to let the anchor fall while the ship has way.

*To BUOY up the cable*, is to fasten some pieces of wood, barrel, &c. to the cable, near the anchor, that the cable may not touch ground, in case it be foul or rocky, lest it should be fretted and cut off.

**BUOYANT**, something which, by its aptness to float, bears up other more ponderous and weighty things. See the article *BUOY*.

**BUPHTHALMUM**, *ox-eye*, in botany, a genus of the syngenesia-polygamia-superflua class of plants of Linnæus, comprehending the asteriscus and asteroides of Tournefort. The species are ten, none of which are natives of Britain.

**BUPLEURUM**, in botany, a genus of the pentandria digynia class. The involucre of the umbells is large and five-leaved; the fruit is striated, compressed, and roundish. The species are seventeen, only two of which are natives of Britain, viz. the rotundifolium, or thorum-wax; and the tenuissimum, or the least hare's-ear.

**BUPRESTIS**, in zoology, a genus of insects belonging to the order of coleoptera. The feelers are like bristles, and about the length of the breast; the head is half retracted in to the thorax. There are twenty-seven species of this insect, most of them natives of the Indies.

**BURDEN**, or *BURTHEN*, in a general sense implies a load or weight, supposed to be as much as a man, horse, &c. can well carry.

**BURDEN** of a *Ship*, is the weight or measure of any species of goods the ship will carry. The burden or tonnage of a ship is found by builders in the following manner: They measure the length of the keel taken within board, and the breadth of the midship boom, taken also within board: these two dimensions they multiply together; and that product they multiply by the depth of the hole, taken from the plank below the keelson, to the under part of the upper-deck plank, and divide the last product by 94; the quotient is the tonnage required.

**BURGAGE**, a tenure, proper to borough-towns, by which the inhabitants hold both their houses and lands



of the king, or other lord, at a certain yearly rent.

BURGESS, an inhabitant, or one that possesses a tenement in a borough-town. It is now generally used to signify a person who represents a borough in parliament.

BURGLARY, in law, implies the breaking into and entering a dwelling house in the night-time, with an intent to commit felony, whether the action be really committed, or not.

BURGOMASTER, or BOURGOMASTER, the chief magistrate of the towns in Flanders, Holland, and Germany. The power and jurisdiction of the burgomaster is not the same in all places, every town having its particular customs and regulations: at Amsterdam there are four chosen by the voices of all those people in the senate, who have either been burgomasters or *schepvins*. Their authority resembles that of our lord-mayor and aldermen; they dispose of all under offices, that fall in their time, keep the key of the bank, and enjoy a salary but of five hundred guilders, all feasts, publick entertainments, &c. being defrayed out of the common treasury.

BURIAL, the interment of a deceased person.

The rites of burial make the greatest and most necessary care, being looked upon in all countries, and at all times, as a debt so sacred, that such as neglected to discharge it were thought accursed: hence the Romans called them *justa*, and the Greeks *νομίμα*, *δικασια*, *οσια*, &c. words implying the inviolable obligations which nature has laid upon the living, to take care of the obsequies of the dead.

BURLESQUE, a jocular species of poetry, first introduced by the Italians, and used to excite laughter, or to ridicule either persons or things.

BURN, in surgery, implies a solution of the continuity of a part of the body by the force of fire.

When either fire itself, or any instrument sufficiently heated by the fire, is applied to any part of the body, the fibres and small vessels at the place of contact will instantly corrugate and burst, while the blood and other contained fluids will be extravasated, and there stagnate and corrupt.

But as burns are attended with consequences proportioned to the vehemence of the fire, they may be divided into four degrees. The first and slightest is that which occasions heat, pain, and a small vesication of the injured part, in a short time. The second degree is when the part is instantly affected with prodigious pain and vesication. The third is when the common integuments and subjacent flesh are so burnt, that they form a crust. The fourth is where every thing is destroyed quite down to the bone. The third degree resembles a gangrene, and the fourth a sphacelus: whence it follows, that burns very much resemble inflammations, and are known in their respective degrees by nearly the same signs.

As a burn is not unlike an inflammation, in regard to degrees, so the method of cure in both is much the same. When there happens a slight burn, or one of the first degree, the most proper medicines, on all accounts, are resolvents, of which there are two kinds principally to be observed, the astringent and the emollient. Mild astringents are spirit of wine rectified, or camphorated: let the part affected be immersed in this spirit, and carefully fomented with linen cloths wet therein. Emollients are of linseed, or sweet almonds, of olives, of white lilies, of henbane, &c. with these the part affected should be frequently anointed. The vulgar method of applying the burnt part to a candle, or the fire, and keeping it in that position as long as you can bear it, repeating this process till all sort of heat and pain is removed, is frequently attended with success. The injured part may be fomented with water, as hot as the patient can bear it, till the pain and heat entirely disappear.

When the burn is of the second degree, which is attended with a blister, it seems improper to open the vesicle, or cut the skin already lacerated; but the best method, in this case, is, with all the haste possible, to apply one or other of the medicines prescribed in the first degree, and renewing it very frequently: if the pain con-

tinues, lenitive remedies are to be used; here the most eligible medicines are the linseed oil, Mynsicht's ointment, unguentum nutritum, &c. With these the part must be often anointed; or they must be spread on linen, and bound to the part affected: as the pain and heat gradually decrease, some plaster, as that of red lead, may be applied, in order to smooth and restore the skin. If this second degree be more intense than ordinary, and affects a great part of the body, it will be necessary forthwith to take away some blood, in proportion to the violence of the burn, even till the patient faints, in order to prevent exulcerations, deformities by seams, and perhaps a gangrene: after which a strong cathartick should be used.

As to the third degree, in which a crust immediately covers the burnt part, it is very difficult, if not absolutely impossible, to cure it, without a suppuration. When this happens in the face, all diligence should be used to prevent deformity, which may be occasioned by a large cicatrix; therefore, in this case, the use of all plasters and ointments whatsoever is to be avoided: but you cannot be too solicitous in forwarding the casting off of the eschar, or crust, and the evacuation of the matter that is concealed under it; yet it should not be torn away with the knife, nor separated with the hands: the easiest and most successful method is by the use of emollients, such as have been mentioned already, applied warm, and repeated till the hard crusts separate from the live flesh; the part should be dressed two or three times a day, and at each dressing, if you should observe any portion of the crust tending to a separation from the rest, it should be removed with the forceps, and the remaining crust anointed with butter, at the same time never neglecting the use of fomentations. The crust being taken off, the wound must be cleansed and healed, the first of which offices may be executed by any mild digestive ointment, mixed up with mel rosarum: the medicines used for healing are principally unguentum diapompholygos, *vel* de lithargyrio, &c. but if any portion of the eschar is left under these ointments and plasters, a danger follows of making a deformed cicatrix, from the constriction of the neighbouring parts, and from the acrimony of the confined sanies. Evacuations by bleeding and purging are always to be premised, and proper regulations, with regard to diet, must be complied with: the best method of encouraging the renovation of the skin, is by frequently holding the burnt part over the steam that rises from boiling water. But as to the fourth degree, which is always attended with extreme danger, where the burning has penetrated to such a depth as to corrupt and mortify all before it, almost to the very bone, all remedies are vain and useless, and there is no other way of assisting the patient, but by cutting off the affected limb, as is done in a sphacelus.

BURN-BAKING, an operation in husbandry for improving land, by parting off the surface, burning it to ashes, and spreading them on the land.

There are several methods of performing this operation, the following is that practised in the fens of Bedfordshire, drawn up by an inhabitant of that county.

About the middle of May, says this gentleman, we plough the land for burning, which is sward-land, that has not been ploughed for four or five years, or perhaps a longer time: our ploughs are what are called Dutch ploughs, with a large share; the edge and point are very thin and sharp, and are kept so by filing: the furrows should not be more than seven or eight inches wide, and an inch and a half thick, having as few baulks as possible. When it has lain so long that the fods or furrows are dry, (in which the farmer's own discretion must guide him, it being impossible to point that out by words) it must be made into heaps about the size of middling grass-cocks, each person carrying on before him as heaps about seven furrows: the work will then direct him how big the heaps should be; they should be made as narrow at top as conveniently they can, by way of prevention against wet weather. If every person keeps his work as to the number of furrows, the heaps will rise in regular rows; but it should be observed to keep these rows in quincunx order, that when you come to spread the ashes, they may cover the ground regularly.

When



When it is fit for heaping, the customary way of this country is to let the burning out to people, to burn and spread the ashes, which must be spread so as to cover the ground all over: the usual price is from four to five shillings per acre; but that, in a great measure, depends upon the dryness or wetness of the season. It would, however, I think, be most advisable, where hands are plenty, to do this work by the day, as you may then employ as many persons as you think fit; for it should be burnt off with all possible expedition, because if it be long in burning, it is attended with bad consequence, which in rainy weather is hard to prevent; it is therefore very requisite to pursue the work briskly, otherwise the grass roots, which lie below the reach of the plough, when ploughed for burning, will shoot out, and become almost as full of grass, as though it had not been ploughed at all: then, when you plough it after the burning, instead of breaking, so that the seed may fall into the cracks, it will burn up as strait as clay, and then no seed can grow any where but in the seams between each furrow.

When one side of the field is cleared, and the ashes spread, you must, as soon as there is room, get to ploughing and sowing the seed. Nor must the furrows now be wider than those already mentioned, and about two inches deep; for as fen-land in general ploughs tough, rather than breaks, you will have more seams than if the furrows were made wider: the custom with us is to sow the seed as soon as possible after the land is ploughed. *Museum Rusticum*, vol. I. p. 420.

The paring and burning of the surface of the earth, is, indisputably, the best and surest way, either to clear, or restore the soil. It is making a most advantageous acquisition to one's own estate, the value of which is at least doubled, and oftentimes quadrupled by this means. To enrich one's self, without doing it at the expence of any person whatever, and, at the same time, to enrich the state, is surely an action worthy of a true patriot, and of a respectable father of a family.

BURNET, the English name of a plant called pimpinella by Linnæus, and tragofelinum by Tournefort.

It is a native of this country, and promises very great advantages as a green succulent food for cattle during the winter months; and the judicious Mr. Rocque observing that burnet retains its verdure amidst all the inclemencies of that season, resolved to try the effect of giving it a good culture. He has succeeded therein to his utmost wish; and the plant bids fair to be of singular utility, where flocks of sheep are kept, because, as it preserves all its leaves unhurt by frost, the farmer may thereby have a constant stock of green food for his ewes and lambs, at a time when turnips and every other succulent plant may fail him.

In describing this plant, Mr. Miller distinguishes seven different species of it; but only three, or perhaps rather but two, of them seem to be the sorts proper to be cultivated for the food of cattle. These are; 1. The tragofelinum majus, umbella candida, greater burnet saxifrage, with a white umbel. 2. Tragofelinum alterum majus, another greater burnet saxifrage; and 3. The tragofelinum minus, or lesser burnet saxifrage. All these are equally hardy plants, and natives of this island: but the largest sorts promise the greatest quantity of fodder, and therefore should be preferred by the husbandman.

BURNING, or BRENNING, in our old customs, denotes an infectious disease, got in the stews by conversing with lewd women, and supposed to be the same with what we now call the venereal disease.

In a manuscript of the vocation of John Bale to the bishoprick of Ossory written by himself, he speaks of Dr. Hugh Weston, who was dean of Windsor, in 1556, but deprived by cardinal Pole for adultery, thus: "At this day is lecherous Weston, who is more practised in the arts of breech-burning, than all the whores of the stews. He not long ago brent a beggar of St. Botolph's parish."

BURNING, in antiquity, a way of disposing of the dead, much practised by the ancient Greeks and Romans, and still retained by several nations in both the E. and W. Indies.

BURNING of land. See the article BURN-BAKING.

BURNING-GLASS, a convex or concave glass, commonly spherical, which being exposed directly to the sun, collects all the rays falling thereon into a very small space, called the focus; where wood, or any other combustible matter being put will be set on fire.

The convex burning-glasses transmit the rays of light, and in their passage refract or incline them towards the axis; having the property of lenses, and acting according to the laws of refraction.

The concave burning-glasses, very improperly so called, being usually made of metal, reflect the rays of light, and in that reflection incline them to a point in their axis; having the property of mirrors, and acting according to the laws of reflection. See LENS, REFRACTION, MIRROR, REFLECTION.

The famous Mr. De la Hire has endeavoured to raise the antiquity of lenses, or lenticular burning-glasses to a very great height, imagining he has found them among the clouds of Aristophanes, Act. II. Sect. 1. where Strepsiades tells Socrates he has found out an excellent contrivance for paying his debts, which was to melt the bond, (which in those days was written on wax) by means of a round transparent stone or glass; which, the scholiast says, they rubbed with oil, and heated it, and then they brought it to a match; and after this manner they lighted the fire. De la Hire cannot understand what the oil was for, unless it was to polish the glass; but be that as it will, he says the scholiast conceived it was convex; which shews, that in his time, though later than Aristophanes, they used such glasses to kindle a fire.

Considering that catoptricks was known and cultivated by the ancients long before dioptricks, it is surprising they could not account for burning by reflection from a concave metal. Euclid in his Catoptricks says, its centre is the burning point; because all the rays which pass through it are returned directly back to it. But as the sun's diameter is so small, these rays are but very few, and the consequence would be, that a very broad speculum would burn no better than a narrow one, which is contrary to experience. It is evident from this, and many other blunders in that book, that Euclid, the geometer, was not the author of it; and also that the ancients made very gross experiments.

Kircher, in *Arte magna Lucis & Umbræ*, says, that he found, by experience the best burning-concaves were such as did not exceed an arch of eighteen degrees in their breadth. If the segments of a greater sphere and a less lie eighteen degrees in degrees in breadth, or even something more or less, the number of degrees in both being the same, the effects of the greater segments will be the greatest. Burning-glasses, that are segments of a greater sphere, do burn at a greater distance than those that are segments of a lesser sphere. Manfredus Septala, at Milan, made a parabolick speculum of this kind, that would burn wood at the distance of sixteen paces.

Mr. Villette, at Lyons in France, made a metal-line burning-concave, of a round figure, thirty inches in diameter, and about a hundred pounds weight, the focus, or burning-point, being about three feet distant from the concave, and its bigness about half a louis d'or. This would burn or melt iron in forty seconds, silver in twenty-four, copper in forty-two; turn quarry-stone into glass in forty-five; mortar in fifty-three; and melted a piece of watch-spring in nine seconds.

Mr. Villette afterwards made another, of thirty-four inches in diameter, that would melt all sorts of metals, of the thickness of a crown piece, in less than a minute; and vitrify brick in the same time.

In the Philosophical Transactions, N<sup>o</sup>. 188. we find mentioned a copper burning-concave, made at Luface, in Germany, of near three Leipstick ells in diameter, and its focus two ells off; being scarce twice so thick as the back of a common knife, and whose force is incredible: for a piece of wood put into the focus, flames in a moment; a piece of lead or tin, three inches thick, will be melted quite through in three minutes time; a piece of iron or steel is presently red-hot, and soon after hath a hole burnt through it.

Copper,



Copper, silver, &c. applied to the focus, melt; and the iron or steel aforesaid melt in five minutes; slate in a few minutes will be turned into black glass; as will tiles, earthen pottsherds, bones, &c.

Mr. Tschirhausen is said to have made convex burning-glasses, of three or four feet in diameter, and whose focus is twelve feet distant, and of an inch and a half in diameter; and, to make this focus still stronger, he contracts it by a second lens, placed parallel to, and at a due distance from the first, and so makes the focus but eight lines in diameter. This glass vitrifies tiles, flates, pumice-stones, &c. in a moment. It melts sulphur, pitch, and all rosins under water; any metal exposed to it in little lumps, upon a coal, melt in a moment; and iron sparkles as in a smith's forge: all metals vitrify on a piece of China-plate, if it be not so thin as to melt itself; and gold, vitrified, receives a purple colour.

Sir Isaac Newton presented a burning-glass to the Royal Society, consisting of seven concave-glasses, so placed, as that all their foci join in one physical point, each glass being about eleven inches and a half diameter. Six of them are placed round the seventh, to which they are all contiguous; and they compose a kind of segment of a sphere, whose subtense is about thirty-four inches and a half, and the central glass lies about an inch further in than the rest; the common focus is about twenty-four inches and a half distant, and about half an inch in diameter. This glass vitrifies brick, tile, &c. in a moment, and in about half a minute melts gold. A certain artificer of Dresden is said to have made very large burning-concaves of wood, whose effects were very little inferior to those made by Tschirhausen. It is likewise said, that one Newman, at Vienna, in the year 1699, made a burning-speculum of stiff-paper, and straw glued to it. And Zacharias Traberus says, that very large burning-speculums may be made of thirty, forty, or more concave speculums, or square pieces of glass, conveniently placed together in a large turned wooden concave or dish; and that their effect will not be much less than if the superficies were contiguous.

That of Mr. de Buffon is a polyedron, six feet broad, and as many high, consisting of 168 small mirrors, or flat pieces of looking-glass, each six inches square; by means of which, with the faint rays of the sun in the month of March, he set on fire boards of beech wood at 150 feet distance. Besides, his machine has the conveniency of burning downwards, or horizontally, as one pleases; each speculum being moveable, so as, by the means of three screws to be set to a proper inclination for directing the rays towards any given point; and it turns either in its greater focus, or in any nearer interval, which our common burning-glasses cannot do, their focus being fixed and determined.

Mr. de Buffon, at another time, burnt wood at the distance of 200 feet. He also melted tin and lead, at the distance of above 120 feet, and silver at 50.

Those who are curious to have a description of that of M. Tschirhausen, with an account of its powers, may consult the history of the academy of sciences, ann. 1699.

**BURNING-MOUNTAINS**, the same with volcanos. See the article **VOLCANO**.

**BURNISHER**, among mechanicks, implies a round piece of polished steel, serving to smooth and give a lustre to metals.

**BURNISHING**, the art of smoothing or polishing a metalline body, by rubbing it briskly with a burnisher.

**BURNT**, something that has undergone the action of the fire, and by that means parted with its liquid and oily particles.

**BURNT-CLAY**, a manure proper for close, compact soils, which it opens, warms, and invigorates, and thereby disposes such lands to part with their vegetative virtues.

**BURR**, the round knob of a horn next a deer's head.

**BURROCK**, a small wier or dam made in a river for taking of fish.

**BURROUGHS**, *Machine*, a mill or machine for grinding and polishing glass plates, invented by Mr.

Burroughs of Southwark; and for which the Society for the Encouragement of Arts, gave him a premium of seventy pounds.

Explanation of plate XIII. representing Mr. Burrough's machine.

This machine consists of a cog-wheel A, (*fig. 1.*) twelve feet in diameter, carrying seventy-two cogs; which turn a trundle-head B, one foot four inches in diameter, and furnished with eight rounds; and also an horizontal spur-wheel C, of twelve cogs, and one foot eight inches in diameter. The trundle-head B turns a spur-wheel D of ten cogs, and two feet eight inches in diameter. This spur-wheel has two cranks, *a, b*, in its shaft; one of which *a*, gives motion to a wooden frame *c*, about thirty-four inches long, and nineteen broad. On the under side of this frame are fastened by screws, twelve pieces of polished metal, each five inches and a half long, and three broad, covered with leather; and underneath these polishers, a glass plate, cemented in another frame, is placed on the bench *d*, and polished with tripoli by the motion given to the upper frame, by the crank *a*. The nuts of the screws, which fasten the polishers to the upper frame, are not screwed close to the wood, in order to give the frame room to play; by which contrivance the perpendicular rise of the crank is avoided, and the motion of the polishers always parallel and equal. The under frame may be moved by the hand in any direction without stopping the machine, by which means the plate, when larger than the polishing frame can cover in its motion, will be equally polished in every part.

The other crank *b* gives motion to two other polishers marked N, O, which have an alternate motion by the bending of the crank; they move upon the same plate, and have an equal number of polishers, as that already described.

The same crank also gives motion to a contrivance represented at *e*, for polishing spectacle glasses. It consists of two segments of the same sphere, one concave and the other convex. On the latter, the glasses are cemented and polished by the former, which is moved by the crank *b*. The convex segment may be moved round by the hand, without stopping the machine, so that all the glasses on its superficies will be equally polished.

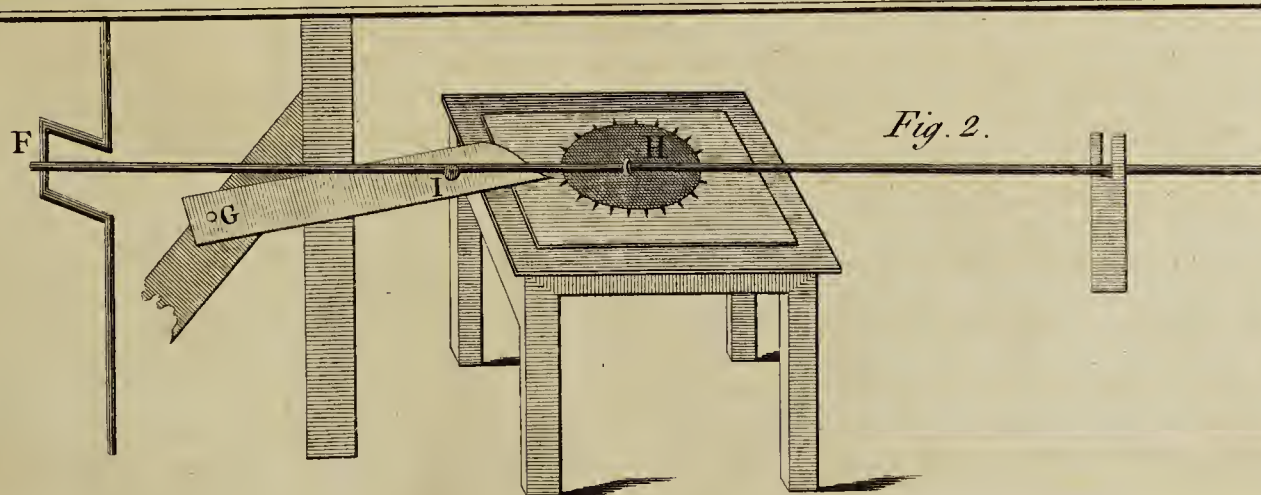
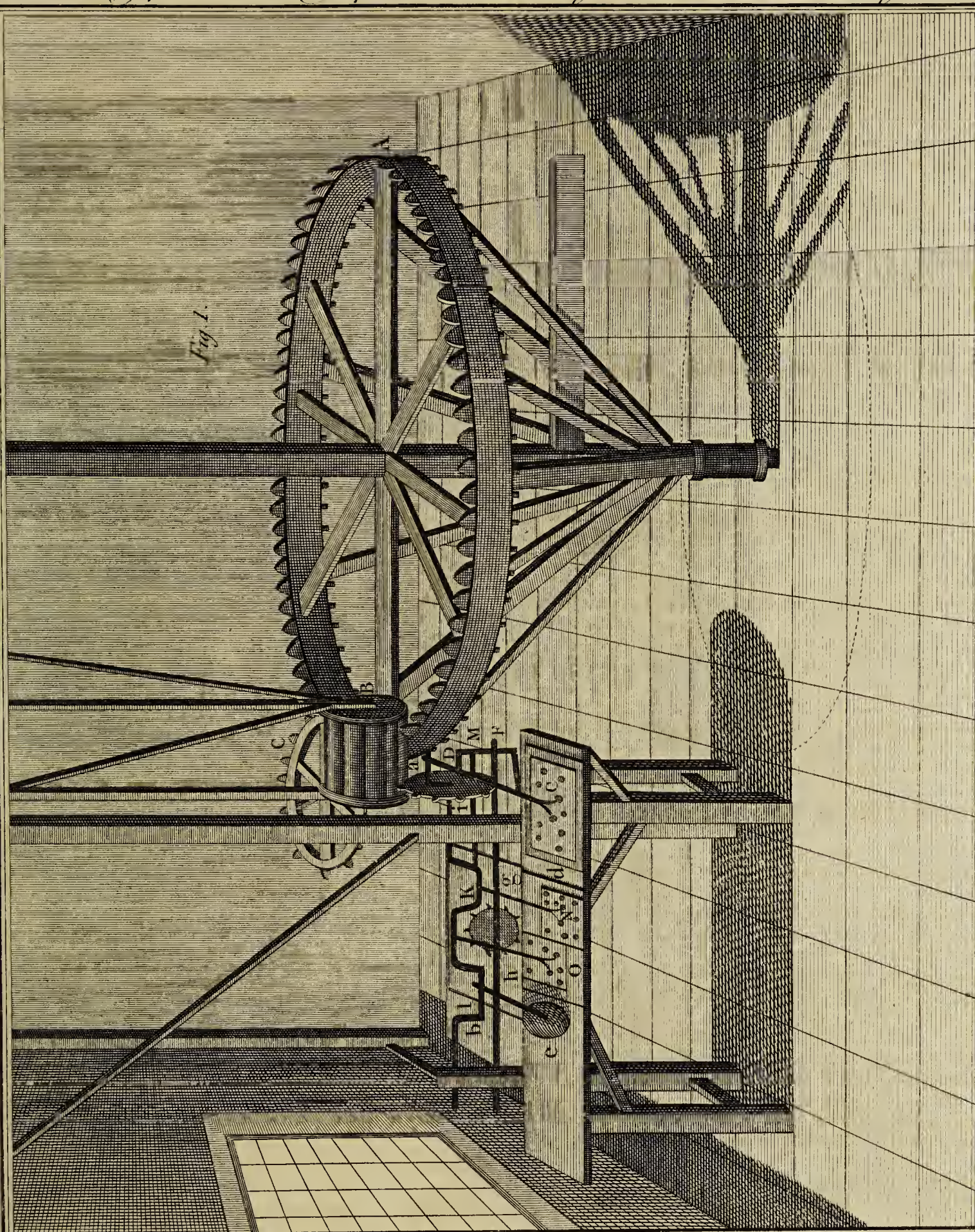
The other spur-wheel C, by means of a crank in its shaft, gives motion to another frame *g*, employed in grinding the glass plates. The rod *h* extended from the crank F, to the frame *g*, is fastened to the latter by means of a pivot, in order to admit of a rotary motion, as well as that given it by the crank in a longitudinal direction. This rotary motion is effected by means of a rod of iron *i*, called a trigger, sharp at the extremity next the frame, where it touches the teeth of an horizontal spur-wheel, or circular piece of wood K, fixed on the grinding plate, while the other end is extended three feet two inches to the centre of motion.

But this contrivance, in which the merit of the machine principally consists, will be much better conceived from a small delineation of it by itself, (*fig. 2.*) where F is the crank marked F, in *fig. 1.* and turned by the spur-wheel C, in the same figure. G is the trigger, three feet two inches long. I, a roll fixed on the trigger for the rod to slide on. H the horizontal spur-wheel eleven inches in diameter, fixed on the grinding-plate, the teeth of which is touched by the trigger, but with a very unequal force, as it will wholly depend upon the grinding-plate's being further from, or nearer to, the centre of motion of the trigger. By this simple contrivance the grinding-plate has a very compound motion, never moving exactly in the same tract, and therefore must grind the plates equally in every part. Several attempts have been made by others for producing the same effect, but without success; the grinding-plate always following the same tract, and consequently the plates were ground unequally.

**BURSA** *Pastoris*, in botany. See the article **SHEPHERDS-POUCH**.

**BURTON**, a sort of small tackle made of two blocks or pulleys till the rope becomes three or four-fold, and requires an additional power in proportion.











It is used to draw tight the top-mast shrouds; and may be otherwise employed to move or draw along, any weighty body on the deck, or in the hold; as anchors, bales of goods, &c.

BUSH, a term used for several shrubs of the same kind growing close together: thus we say, a furze-bush, bramble-bush, &c.

BUSH is sometimes used, in a more general sense, for any assemblage of thick branches interwoven and mixed together.

Burning-BUSH, that bush wherein the Lord appeared to Moses at the foot of Mount Horeb, as he was feeding his father-in-law's flocks.

As to the person that appeared in the bush, the text says, "That the angel of the Lord appeared unto him in a flame of fire; out of the midst of the bush:" but whether it was a created angel, speaking in the person of God, or God himself, or (as the most received opinion is) Christ the Son of God, has been matter of some controversy among the learned. But it is plain that the angel here spoken of was no created being, from the whole context, and especially from his saying, "I am the Lord God, the JEHOVAH," &c. since this is not the language of angels, who are always known to express themselves in such humble terms as these, "I am sent from God; I am thy fellow servant," &c. It is a vain pretence to say, that an angel, as God's ambassador, may speak in God's name and person; for what ambassador of any prince ever yet said, "I am the king?" Since therefore no angel, without the guilt of blasphemy, could assume these titles; and since neither God the Father, nor the Holy Ghost, are ever called by the name of angel, *i. e.* a messenger, or person sent, whereas God the Son is called by the prophet Malachi, (chap. iii. 1.) "The angel of the covenant;" it hence seems to follow, that this angel of the Lord was God the Son, who might very properly be called an angel, because in the fulness of time he was sent into the world in our flesh, as a messenger from God, and might therefore make these his temporary apparitions, presages and forerunners, as it were, of his more solemn mission.

The Mahometans believe, that one of Moses's shoes, put off by him as he drew near the burning bush, was placed in the ark of the covenant, in order to preserve the memory of this miracle.

BUSHEL, a measure of capacity for dry commodities, containing four pecks, or eight gallons, or 1-eighth of a quarter; for, pursuant to the act, every bushel is to have a plain and even bottom, be eight inches deep, and eighteen inches and a half wide throughout.

BUSKIN, a kind of shoe or rather half boot, adapted to either foot, and worn by either sex. It was formerly much worn, particularly by tragick actors on the stage; and hence it is frequently used by authors, to signify tragedy itself.

BUSS, in maritime affairs, a small sea vessel used in the herring fishery, both by the English and Dutch.

BUST, or BUSTO, in sculpture, implies the figure or representation of a person, where only the head, shoulders and stomach of a person are represented. The Italians indeed used the word Busto to signify the trunk of the human body from the neck to the hips.

BUSTARD, *Otis*, in ornithology, the name of a bird, about the size of the common peacock, and greatly esteemed for the delicacy of its flesh.

BUSTURII, among the ancient Romans, were gladiators who fought round the funeral pile of a person of distinction deceased, during his obsequies.

BUTLER, was formerly the title of an officer in the court of France; but now generally signifies a servant in the houses of opulent persons, to whom the care of the wine, plate, &c. is entrusted.

BUTMENTS, among builders, imply those props or supporters, erected to sustain or keep steady the feet of arches.

BUTT, in commerce, implies a vessel, or measure of capacity, containing two hogsheds, or 126 gallons.

BUTT, or BUTT-END, among shipwrights, the end

of any plank in a ship's side, which unites with the end of another.

BUTTER, a fat unctuous substance separated from milk by means of churning. Chymists give the new appellation of butter, to a great number of preparations formerly in use, merely on account of their resemblance to butter in their consistence.

BUTTER-BUMP, or bittern, in zoology, a bird common in the fens of Lincolnshire, whose cry is that of *bump*. See the article BITTERN.

BUTTERFLY, the English name of a numerous genus of insects, called by naturalists Papilio. See the article PAPILIO.

BUTTERFLY-FLOWERS, the same with papilionaceous flowers, composing the seventeenth class in the Linnæan system of botany: the flowers of the pea, bean, lupine, broom, &c. are of this kind.

BUTTER-MILK, the serum of the milk remaining behind, after the butter is churned. It is esteemed a very wholesome food, especially during the spring, and is recommended by many physicians in hectic fevers.

BUTTERY, a room in houses of opulent families, appropriated to the use of the butler, and where he deposits table-linen, napkins, plate, &c.

BUTTOCK, among shipwrights, implies the round parts of a ship behind, under the stem, terminated above by the counter, and below, by the after part of the bilge.

BUTTON, an article in dress, whose form and use are too well known to need any description here.

BUTTRESS, among builders, signifies a mass of stone, brick, &c. erected on the outside, as a proper support to the sides of a building, wall, &c. It is also erected against the angles of towers, steeples, &c.

BUXTON, a place in the peak of Derbyshire, celebrated for medicinal waters; the hottest in England, next to Bath.

Buxton-Wells. The strata of earth and minerals, in the parts adjacent to Buxton, are peat-moss, blue clay, iron, and coal, mixed with sulphur and brazil.

The warm waters there, at present, are the bath, which takes in several warm springs; St. Ann's well, a hot and cold spring rising up into the same receptacle; and Bingham-well.

These waters greatly promote digestion, unless they are drunk too long, in which case they relax the stomach, and retard digestion; they are well adapted to obstructions of every kind, whence they produce surprising effects in gouty, rheumatick, athritick, and scorbutick pains. As this water is warm, highly impregnated with a mineral steam, vapour, or spirit, it is signally beneficial to cramps, convulsions, dry asthma, the bilious cholick, stiffness, &c.

They advise both drinking and bathing in the use of these waters; only the last is of bad consequence in the gout, inward inflammations, fevers, dysentery, large inward tumours, or in an outward pressure of the body.

BUXUS, in botany, the box-tree. See BOX.

BYRRHUS, in zoology, an order of insects belonging to the order of coleoptera. The feelers are elevated pretty solid, and a little compressed. There are five species, all of which are to be found on particular plants, and principally distinguished from each other by the colour and figure of the elytra or crustaceous wing-cases.

BYSSUS, in botany, a genus of mosses belonging to the cryptogamia algæ. The character is taken from this circumstance, that they are covered with a simple capillary filament or down, resembling soft dust. The species are 15, all natives of Britain.

Byssus, in antiquity, that fine Egyptian linen whereof the tunicks of the Jewish priests were made.

Philo says, that the byssus is the clearest and most beautiful, the whitest, strongest, and most glossy sort of linen; that it is not made of any thing mortal, that is to say, of wool, or the skin of any animal, but that it comes out of the earth, and becomes always whiter, and more shining, when it is washed as it should be.



# C.

## C A B

**C**, The third letter and second consonant of the alphabet, is pronounced like *k*, before the vowels *a*, *o*, and *u*; but like *s*, before *e* and *i*.

As an abbreviation, **C** stands for Caius, Carolus, Cæsar, *condemno*, &c. and **CC** for *consulibus*.

As a numeral, **C** signifies 100, **CC** 200, &c.

**C**, in musick, placed after the cliff, intimates, that the musick is in common time, which is either quick or slow, as it is joined with *alegro* or *adagio*: if alone, it is usually *adagio*.

If the **C** be crossed or turned, the first requires the air to be played quick, and the last very quick.

**CAABA**, a square stone edifice in the temple of Mecca, supposed to have been built by Abraham and his son Ishmael; being the part principally revered by the Mahometans, and to which they always direct themselves in prayer.

The length of the caaba is about twenty-four cubits, its breadth twenty-three, and height twenty-seven cubits; the door, which is on the east-side, is four cubits from the ground, and the floor level with the bottom of the door. In the corner next this door is the famous black stone, which is set in silver, and exceedingly respected by the Mahometans. The pilgrims kiss it with great devotion, and it is by some called the right hand of God on earth. It is fabled to be one of the precious stones of Paradise, which fell down to the earth with Adam, and being taken up again at the deluge, was brought back by the angel Gabriel to Abraham, when he was building the caaba. It was at first whiter than milk, but grew black long ago; some say by the touch of a menstruous woman, others by the sins of mankind, others by the numerous kisses of the devotees. On the north-side of the caaba, within a semicircular inclosure, lies the white stone, said to be the sepulchre of Ishmael, which receives the rain water that falls off the caaba, by a spout formerly of wood, but now of gold. The caaba has a double roof, supported within by three octangular pillars of aloes wood, between which, on a bar of iron, hang some silver lamps. The outside is covered with rich black damask, adorned with an embroidered border of gold, which is changed every year, and was formerly sent by the caliphs, afterwards by the sultans of Egypt, but now provided by the Turkish emperors. At a small distance from the caaba, on the east-side, is the station or place of Abraham, where there is a stone in which they pretend to shew the footsteps of that patriarch, supposed to have been made when he stood on it in building the caaba, which served him for a scaffold, with this peculiar advantage, that it rose and fell of itself, as he had occasion.

**CAB**, or **KAB**, a Hebrew measure of capacity, equal to the 6th part of the seah, or an 18th of the epha.

The cab of wine contained two English pints; the cab of corn  $2\frac{5}{8}$  pints corn measure.

**CABALA** *Vein*, in natural history, a name given by our Sussex miners to one kind of the iron ore commonly wrought in that country. It is a stony ore, of a brownish colour, with a blush of red, which is more or less conspicuous in different parts of the same masses.

**CABALLINE**, denotes something belonging to horses: thus caballine aloes is so called from its being chiefly used for purging horses; and common brimstone is called sulphur caballinum for a like reason.

**CABBAGE**. *Brassica*, in botany, a genus of plants. The flower consists of four leaves, and is of the cruciform kind; the pistil which arises from the cup, becomes at length a long cylindrical pod, divided into two

## C A B

cells, which are filled with roundish seeds, by an intermediate membrane. Tournefort has enumerated twenty-five, and Mr. Miller twenty-two species of cabbage.

All the common sorts of cabbages are largely cultivated about London. The common, white, red, flat, and long-sided ones, are chiefly for winter use. The seeds of these sorts must therefore be sown in the middle of March, in beds of good fresh earth; and in April, when the young plants will have about eight leaves a-piece, they are to be pricked out into shady borders, about three inches square; and about the middle of May they must be transplanted to the places where they are to remain; and this is commonly between cauliflowers or artichokes, at about two feet distance in the rows. They must be watered at times, and the earth must be hoed up about their roots, and kept clear from weeds.

These cabbages will be fit for use soon after Michaelmas, and will continue till February, if not destroyed by bad weather; to prevent which, the gardeners about London pull up their cabbages about November, and trench the ground in ridges, laying their cabbages against the ridges, as close as possible on one side, burying their stems in the ground; and in this manner they let them remain till after Christmas, when they cut them for the market.

**CABBAGE-TREE**, the name of a very tall species of the palm-tree, common in the W. Indies, and other parts of the Torrid Zone.

**CABBAGING**, among gardeners, implies the knitting of cabbages into round heads.

**CABBALA**, among the Jews, implies the mystical interpretation of scripture, handed down from tradition.

The professors of cabbala, study principally the combination of particular words, letters, and numbers, and, by this means, pretend to discover what is to come, and to see clearly into the sense of many difficult passages in scripture: there are no sure principles of this knowledge, but it depends upon some particular traditions of the ancients; for which reason it is termed cabbala.

The cabbalists have abundance of names, which they call sacred: these they make use of in invoking of spirits, and imagine that they receive very great light from them; they tell us, that the secrets of the cabbala were discovered to Moses on Mount Sinai, and that these have been delivered down to them from father to son, without interruption, and without any use of letters; for to write them down, is what they are, by no means, permitted to do. This is likewise termed the oral law, because it passed from father to son, in order to distinguish it from the written laws.

There is another cabbala, called artificial, which consists in searching for abstruse and mysterious significations of a word in scripture, from whence they borrow certain explanations, by combining the letters which compose it: this cabbala is divided into three kinds, the gematry, the notaricon, and the temura or themurah. The first whereof consists in taking the letters of a Hebrew word for cyphers or arithmetical numbers, and explaining every word by the arithmetical value of the letters whereof it is composed. The second sort of cabbala, called notaricon, consists in taking every particular letter of a word for an intire diction; and the third, called themurah, i. e. change, consists in making different transpositions of letters, placing one for the other, or one before the other.

Among the Christians likewise, a certain sort of magick is, by mistake, called cabbala, which consists in



using improperly certain passages of scripture, for magick operations, or in forming magick characters or figures with stars and talismans.

Some visionaries, among the Jews, believe, that Jesus Christ wrought his miracles by virtue of the mysteries of the cabbala.

CABBALISTS, the Jewish doctors, who profess the study of the cabbala.

CABECA, or CABBESSE, a name given by the E. Indians to the finest silks made in that country.

CABIN, in ship-building, signifies an apartment in some part of the ship, for any of the officers to sleep in, &c.

CABINET, a curious piece of workmanship, being a kind of press with drawers, &c.

CABINET of *Natural History*, implies a building in which specimens of the principal objects in natural history are ranged in a proper manner.

CABIRI, in the pagan theology, implied the great and powerful gods.

CABIRIA, festivals instituted in honour of the Cabiri. They were celebrated in Samothracia, Thebes and Lemnos.

CABLE, a thick, large, strong rope, commonly of hemp, which serves to keep a ship at anchor.

There is no merchant-ship, however weak, but has at least three cables; the chief cable, or cable of the sheet anchor, a common cable, and a smaller one.

Cable is also said of ropes, which serve to raise heavy loads, by the help of cranes, pulleys, and other engines. The name of cable is usually given to such as have, at least, three inches in diameter; those that are less are only called ropes of different names, according to their use.

Every cable, of what thickness soever it be, is composed of three strands; every strand of three ropes; and every rope of three twists: the twist is made of more or less threads, according as the cable is to be thicker or thinner.

In the manufacture of cables, after the ropes are made, they use sticks, which they pass first between the ropes of which they make the strands, and afterwards between the strands of which they make the cable, to the end that they may all twist the better, and be more regularly wound together; and also, to prevent them from twining or intangling, they hang, at the end of each strand, and of each rope, a weight of lead or stone.

The number of threads each cable is composed of is always proportioned to its length and thickness; and it is by this number of threads that its weight and value are ascertained: thus a cable of three inches circumference, or one inch diameter, ought to consist of 48 ordinary threads, and weigh 192 pounds; and on this foundation is calculated the following table, very useful for all people engaged in marine commerce, who fit out merchant-men for their own account, or freight them on the account of others.

*A table of the number of threads and weight of cables of different circumferences.*

Circumf.	Threads.	Weight.
3 inches.	48	192 pounds.
4	77	308
5	121	484
6	174	696
7	238	952
8	311	1244
9	393	1572
10	485	1940
11	598	2392
12	699	2796
13	821	3284
14	952	3808
15	1093	4372
16	1244	4976
17	1404	5616
18	1574	6296
19	1754	7016
20	1943	7772

*Sheet-Anchor* CABLE, is the greatest cable belonging to a ship.

*Serve or plate the* CABLE, is to bind it about with ropes, clouts, &c. to keep it from galling in the hawse.

*To splice a* CABLE, is to make two pieces fast together, by working the several threads of the rope, the one into the other.

*Pay more* CABLE, is to let more out of the ship.

*Pay cheap the* CABLE, is to hand it out apace. *Veer more* CABLE, is to let more out, &c.

CABLED, in heraldry, a term applied to a cross, formed of the two ends of a ship's cable; sometimes also to a cross covered over with rounds of rope, more properly called a cross-corded.

CABLED-flute, in architecture, such flutes as are filled up with pieces, in the form of a cable.

CABOCHED, in heraldry, is when the heads of beasts are borne without any part of the neck, full-faced.

CACALIA, in botany, a genus of the syngenesia polygamia æqualis class. The receptacle is naked; the pappus is hairy; and the calix is cylindrical, oblong, and has a kind of small cup at the base. There are 12 species, none of which are natives of Britain.

CACALIANTHEMUM, in botany, a synonyme of the cacalia. See CACALIA.

CACAO, the chocolate nut tree, in botany, a genus of plants, common in the hot climates, particularly in America, and called by Linnæus theobroma.

The cacao nuts, which are the fruit of this tree, must, in order to be good, have a very brown and pretty even skin or peel, and when it is taken off, the kernel must appear full, plump; and shining, of a hazel-nut colour, very dark on the outside, a little more redish within, of a bitterish and astringent taste, without any greenish or musty flavour. It is one of the most oily fruits which nature produces, and has this wonderful advantage that it never grows rank, how old soever it be, as all other fruits do, which have any analogy with this: such as almonds, kernels of pine-apples, pistachio-nuts, olives, &c. It is brought from Caracca, Marignan, and the French islands; but the first kind is the best. The Mexicans esteem cacao-nuts as anodyne, and eat them raw, to assuage pains of the bowels. In some parts of America, the seeds are used by the Indians as money; twelve or fourteen are valued at a Spanish real, or six-pence three farthings sterling. Of this fruit is made an excellent conserve, which far excels all the sweet-meats made in Europe, and also chocolate.

CACHETICK, something belonging to, or partaking of a cachexy.

CACHEXY, among physicians, signifies an universal bad habit of body, occasioned by some defect in digestion, or a defect in some of the vessels which convey the nutritious juices to the several parts of the body.

From the first of these causes arise many disorders, according to the various colour, quantity, tenacity, acrimony, fluidity of the distempered humour, as a discolouring of the skin, a swelling under the eyes; the fleshy parts become bloated; and lastly, the body is either reduced to a skeleton, or afflicted with a leucophlegmatia and a dropsy. The vessels may be too contractile or too lax, and consequently the disorders that proceed from thence, may be looked upon as the causes of this disease, and the fault may lie in the assimilating faculty, if the force, by which the fluids are circulated, is too languid or too violent. From what has been said, the diagnostick signs are evident, and the prognosticks may be gathered from the consideration of the cause, duration, the effects and degree of the disease, &c.

The cure sometimes requires a correction and a moderate inspissation of the too acid fluid. When it is tenacious and stagnating, it must be dissolved. But the medicines must be varied, according to the various causes, from whence these two faults arise. The greatest care must be taken, that the aliment be most like the healthy fluids, and easy of digestion. The organs of digestion should be disposed to perform their office



office by mild digestives, then by vomits and purges, and by medicine which promote digestion.

When, by the use of these, the morbidick matter is attenuated, you must proceed to saponaceous remedies, diureticks, and sudorificks, and last of all to chalybeates, with exercise, frictions, and baths.

When a cachectick tabes arises, from too great an acrimony, the nature of that acrimony must be inquired into, and corrected by its contraries.

CACHRYIS, in botany, a genus of the pentandria digynia class. The fruit is oval and a little angled. There are but two species, viz. the Libanotis, a native of Sicily; and the Sicula, a native of Sicily and Spain.

CACTUS, a name given by Linnæus to the Melocactus, cereus apuntia, tunia, and pereskia of other authors.

CADARI, or KADARI, a sect of Mahometans, which attributes the actions of men to men alone, and not to the divine decree determining his will, and denies all absolute decrees, and predestination. Ben Aun calls the cadari, the magi or manichees of the mussulmans.

CADE, a cag, cask, or barrel, containing a certain number of some particular commodities. Thus a cade of red herrings, is a vessel containing three hundred; and a cade of sprats is a vessel containing a thousand of those fishes.

CADE-LAMB, a house lamb, or one weaned and brought up by hand in the house.

CADENCE, in musick, the conclusion of a song, &c. or its parts, dividing it, as it were, into so many members or parts.

CADENCE, in rhetorick and poetry, implies the running of the composition, otherwise called the numbers.

CADENE, in commerce, one of the sorts of carpets imported from the Levant.

CADET, among military gentlemen, implies a young gentleman, who applies himself to the study of fortification and gunnery, and serves in the army without pay, till a vacancy happens for his promotion.

CADI, a civil magistrate in the Ottoman empire.

CADILESCHER, in the Turkish empire, the name of a principal magistrate, being the same as a chief justice among us.

CADMIA, a fictitious substance produced in copper works, and much used by the ancient physicians but not known in the modern practice.

CADUCEUS, Mercury's rod, borne by that deity as the ensign of his quality and office. It represented a wand entwisted by two serpents.

CÆCUM, in anatomy, the first of the thick intestines, often called the blind gut.

CÆMENT, or CEMENT, among mechanicks, any glutinous substance capable of uniting and keeping the parts of bodies in close cohesion.

One of the finest, and at the same time strongest cement for joining broken glasses, porcelain, &c. is the juice of garlick, procured by stamping the herb in a stone mortar. This cement, if the operation be done with care, leaves very little mark of the fracture. Another cement is made by beating the white of an egg, and mixing it with quick-lime. With either of these cements the glasses, pieces of china, &c. are to be joined, and dried in the shade.

A cement for cracked chymical glasses may be prepared in the following manner: Take equal quantities of wheat flour, fine powdered Venice glass, and pulverized chalk; one half of the same quantity of fine brickdust, and a little scraped lint: Mix them all together with the whites of eggs. Spread this mixture upon a piece of linen cloth, and apply it to the cracks of the glasses; remember to dry the glasses thoroughly before you apply the cement.

CÆMENT, among builders, a strong sort of mortar, used to bind bricks or stones together for some kind of mouldings; or in cementing a block of bricks for the carving of capitals, scrolls, or the like. There are two sorts, 1. Hot cement, which is the most common, made of resin, bees-wax, brickdust, and chalk boiled together. The bricks to be cemented with this kind,

must be made hot with the fire, and rubbed to and fro after the cement is spread, in the same manner as joiners do when they glue two boards together. 2. Cold cement is made of Cheshire cheese, milk, quick-lime, and whites of eggs. This cement is less used than the former, and is accounted a secret known but to few bricklayers.

CÆMENT, among engravers, jewellers, &c. a composition of fine brickdust well sifted, resin and bees wax, in use among these artificers to keep the metals to be engraven, or wrought on, firm to the block; and also to fill up what is to be chiseled.

CÆMENT, in chymistry a kind of menstruum compounded of salts, sulphurs, and brick reduced to dry powders, and strewed betwixt plates of metal, in order to raise their colour, or separate one metal from another.

Cæments are prepared of such salts, and other ingredients, as by their acrimony, corrode and separate the silver, copper, or other metals from the body of the gold.

There are various kinds of cæments, but those called the common and royal, are mostly used by refiners. The first is made of brickdust, nitre, and verdigrease; the second, of sal gemmæ, and armoniack, each one part, two parts of common salts and four of bole; the whole reduced into a paste, with urine.

In compounding cæments, it must be observed to use a weak sort in refining gold of a little value; but when the gold has but a small mixture of other metal-line particles in it, then the most efficacious cæments are to be administered, by which means much time and expence will be saved.

Cæments used in raising the colour of gold, are called gradatory cæments.

In all these copper is an ingredient.

CÆMENT-POTS, or those used in the cæmentation of metals, are made of fine potter's clay, and that either pure, or mixed with sand in different proportions.

CÆMENTATION, in a general sense, the corroding of metals in a dry form, by means of the fumes of acid salts.

It is performed in the following manner.

After the copper has been separated as much as possible by copelling, a stratum of cement of about half an inch in thickness, is spread in the bottom of the cement-pot; over this are laid thin plates of gold, then another stratum of cement, and so on alternately till the pot be filled within half an inch of the brim. This being done, the pot is covered up, and encompassed with fire which should be made gradually fiercer and fiercer; and in sixteen or twenty hours after they have been red hot, entirely removed, that every thing may cool by degrees. Then the pots are to be opened, the cement taken out, and if it is grown too hard, to be softened by a sprinkling of hot water. The plates of gold must be washed in hot water, and the water renewed, till it be free from all saline taste; for the salts, together with the metal they have corroded, will be contained in the plates or gold. The gold must be tried with the touch-stone, or some more certain method, to know if it has the degree of fineness required. And if it is not pure enough, it must be cæmented a second time, and, if necessary, with a stronger cement.

CÆSAR, in Roman antiquity, a title borne by all the emperors, from Julius Cæsar to the destruction of the empire. It was also used as a title of distinction, for the intended or presumptive heir of the empire, as king of the Romans is now used for that of the German empire.

This title took its rise from the surname of the first emperor, C. Julius Cæsar, which, by a decree of the senate, all the succeeding emperors were to bear. Under his successor, the appellation of Augustus being appropriated to the emperors, in compliment to that prince, the title of Cæsar being given to the second person in the empire, though still it continued to be given to the first; and hence the difference betwixt Cæsar used simply, and Cæsar with the addition of Imperator Augustus.

CÆSALPINIA, in botany, a genus of the decandria



dria monogynia class. The calix has five segments, the lowest of which is largest; the corolla consists of five petals; the capsule is of the pod kind. There are four species, all natives of the Indies.

CÆSARIAN SECTION, in midwifery, implies a chirurgical operation, by making an incision in the abdomen of the mother, and extracting the child from the womb, through the aperture, where it is impossible to do it in the natural way.

CÆSTUS, in antiquity, a large gauntlet, composed of raw hides, used by wrestlers at the publick games.

CÆSTUS, also implied a kind of girdle made of wool, worn by virgins, and which the husband untied the first day of marriage.

CÆSURA, in ancient poetry, implies the division of a word in scanning a verse, so that one part of the word seems cut off, and goes to a different foot from the rest.

In modern poetry, it signifies a rest, or pause, about the middle of an alexandrine verse.

CÆTERIS PARIBUS, a Latin term signifying the rest being alike, or equal. It is often used both by mathematical and physical writers.

CAFFA, in commerce, painted cotton cloths, manufactured in the East-Indies.

CAFFILA, a company of merchants or travellers, who join together in order to go with more security through the dominions of the grand Mogul, and through other countries on the continent of the East-Indies.

The caffila differs from a caravan, at least in Persia; for the caffila belongs properly to some sovereign, or to some powerful company of Europe; whereas a caravan is a company of particular merchants, each trading upon his own account. The English and Dutch have each of them their caffila at Gambrun.

CAFFILA, on the coast of Guzerat or Cambaya, signifies a small fleet of merchant-ships.

CAG, or KEG of sturgeon, salmon, &c. signifies a barrel containing from four to five gallons.

CAIMACAN, an officer among the Turks, nearly answering to our lieutenant.

CAINIANS, or CAINITES, a sect of hereticks, who adopted all that was impure among the various sectaries known in their age. They sprung up in the year 130, and called Cain their father and protector.

CAISSON, among architects, signifies a large wooden frame or chest, used in laying the foundation of the piers of a bridge.

CAISSON, in military affairs, implies a wooden chest, filled with gunpowder, bombs, &c. This is buried under some work, which must soon fall into the hands of the enemy; and as soon as that happens, the caisson is fired, in order to blow up the assailants.

CALIBASH, in botany, a species of the cucurbita. See the article CUCURBITA.

CALIMANCO, the name of a species of woollen stuff, manufactured both in England and Brabant.

CALAMINARIS, or LAPIS CALAMINARIS, in natural history, the ore of zinc; being a species of fossil of a spongy substance, and a lax, cavernous texture, though considerable heavy.

It is of no determinate shape or size, but is found in masses of various and irregular figures. It is when most pure and perfect, of a pale brownish grey. It is found in Germany, Saxony, Bohemia, and England.

The great use of the lapis calaminaris is the mixing with copper, for the making of brass; this change it makes in copper, is wholly in virtue of the zinc it contains; which zinc, when separated, will do the same.

After roasting the calamine, in order to purge it of sulphureous or arsenical matter, it is used by physicians in collyria against defluxions of thin acrid humours upon the eyes, for drying up moist running ulcers, and healing excoriations.

CALAMINT, *Calamintha*, in botany, a distinct genus of plants, according to Tournefort, but comprehended under the melissa by Linnæus.

Calamint is esteemed a good aperient and diaphoretick.

*Water-CALAMINT*, a name sometimes given to several species of mint. See MENTHA, and MINT.

CALAMUS, in botany, a genus of the hexandria monogynia class. The calix has six leaves; it has no corolla; the berry is imbricated, and contains but one seed. There is but one species, viz. the rotang, a native of India.

CALAMUS *aromaticus*, or sweet-scented flag, in the materia medica, a species of flag called acorus by Linnæus. See ACORUS. The root is generally looked upon as a carminative and stomachick medicine, and as such is sometimes used in practice.

CALAMUS *scriptorius*, in antiquity, a reed or rush to write with. The ancients made use of styles to write on tables covered with wax; and of reed, or rush, to write on parchment, or Egyptian paper.

CALASH, or CALESH, a light and very low kind of chariot, used chiefly for taking the air in parks and gardens.

CALCANEUM, or OS CALCIS, in anatomy, the bone lying under the heel. See SKELETON.

CALCAR, among glass makers, a kind of oven, or reverberatory furnace, where the frit is made.

CALCARIOUS, something belonging to, or partaking of the nature of calx or lime.

CALCEDON, among jewellers, implies a flaw or foul vein in any precious stone, resembling the chalcidony. See CHALCEDONY.

CALCINATION, in chymistry, the art of separating by the means of fire, the fluid from the solid parts of bodies, in order to reduce the latter to a calx.

CALCULATION, the art of computing several sums by the rules of arithmetick. But the word is more particularly used to signify astronomical and geometrical computations; as in finding the time of eclipses, making the various tables, &c.

CALCULUS, in natural history, implies a pebble or small stone.

CALCULUS *Differentialis*, is the arithmetick of infinitely small differences between variable quantities, which in England we call fluxions. The calculus differentialis therefore, and fluxions, are the same thing under different names; the latter given by Sir Isaac Newton, and the former by Mr. Leibnitz, who disputes with Sir Isaac the honour of the discovery.

Mr. Leibnitz, about 1676, by most foreigners is allowed to have first invented this doctrine of infinite small quantities, who called it the calculus differentialis; but it is plain, from Sir Isaac's papers, that Sir Isaac was the first inventor of it, who being too free in communicating it to Mr. Leibnitz, he stole it from him; and that the suspicion might be the less, he invented different words and notes from those in Sir Isaac's method; for instead of putting the fluxion of  $x$  thus,  $\dot{x}$ , he puts it thus,  $dx$ ; and for  $y$ ,  $dy$ , instead of  $\dot{y}$ ; and these are used by almost all foreigners.

Yet even James Bernoulli, in the Leipzick acts for January 1691, acknowledges, that our famous Dr. Barrow, had given some specimens of this method above ten years before Mr. Leibnitz in his geometrical lectures, and of which all his apparatus of propositions there contained are so many examples.

He also acknowledges that Mr. Leibnitz's method of calculus differentialis, is founded on Dr. Barrow's and differs from it only in some notes and compendious abridgments. See the article FLUXIONS.

CALCULUS *exponentialis*, among mathematicians, a method of differencing exponential quantities, and summing up the differentials of exponential quantities. See the article FLUXIONS.

CALCULUS INTEGRALIS, or SUMMATORIUS, is a method of summing up differential quantities; that is, from a differential quantity given, to find the quantity from whose differencing the given differential results. See the article FLUXIONS.

CALEFACTION, the production of heat, impressed by a hot body upon other bodies about it.

CALÉNDAR, is a political distribution of time, accommodated to the uses of life, and taken from the motions of the heavenly bodies. Of this kind are those annual books, wherein the days of the month, the festivals,



festivals, the sign the sun is in, the sun's rising and setting, the changes of the moon, &c. are exhibited, which we also call almanacks. But the word calendar seems to come from the word *calendæ*, which amongst the Romans signifies the first days of every month.

The first calendar among the Romans was constructed by Romulus, who, being ignorant of the science of astronomy, supposed the sun to make its annual revolution in three hundred and four days, and therefore divided the year into ten months only, beginning on the first day of March. But Numa Pompilius, who added two months more, viz. January and February, placed them before March. His year consisted of three hundred and sixty five days. This was afterwards improved by Julius Cæsar, with the help of Sosigenes, a celebrated astronomer of those times, who found that the dispensation of time in the calendar could never be settled on any sure footing, without having regard to the annual course of the sun. Accordingly he observed the sun's annual revolution to be performed in three hundred and sixty five days, six hours; therefore he reduced the year to the same number of days, which was retained in most Protestant countries, and in our nation till the year 1752. This correction of the Julian calendar disposes the year into quadrennial periods, whereof the first three years, which were called common, consisted of three hundred and sixty-five days, and the fourth, called bissextile, of three hundred and sixty-six, by reason of the six hours, which in four years make a day, or somewhat less; for in one hundred and thirty-four years an intercalary day is to be retrenched. On this account it was that pope Gregory XIII. with the advice of Clavius and Ciaconius, appointed that the hundredth year of each century should have no Bissextile, excepting each fourth century: that is, a subtraction of three bissextile days is made every four centuries, by reason of the eleven minutes wanting of the six hours, whereof the bissextile consists. See the article *BISSEXTILE*.

*Julian* CALENDAR, or old style. See *Old* STYLE.

*Gregorian* CALENDAR, or new style. See the article *New* STYLE.

CALENDAR, in mechanicks, implies a machine used in several manufactures for pressing, smoothing and giving a gloss to silks, stuffs, and linens.

CALENDIS, CALENDULÆ, in the old Roman chronology, implies the first days of every month.

CALENDULA, MARYGOLD, in botany, a genus of the syngenesia polygamia necessaria class. The receptacle is naked; it has no pappus; the calix consists of many equal leaves; the seeds of the disk are membranaceous. There are eight species, none of them natives of Europe. The flowers of the calendula officinalis, or garden marygold, are said to be aperient and attenuating, as also cardiack, alexipharmick, and sudorifick. They are principally celebrated uterine obstructions, and for throwing out the small pox.

CALENTURE, among physicians, implies a disorder incident to seamen in hot climates.

When a person is seized with this disorder, he imagines the sea to be green fields, and endeavours to jump overboard, in order to repose in these imaginary places of delight: many by the strength of this delusion leap into the sea and perish.

CALF, in zoology, the young of the ox kind.

There are two ways of breeding those calves you design to rear; the one is to let them run with the dam all the year, which is the common way used in the cheap breeding countries, which they reckon makes the best cattle; and the other way is, to take them from the dams after they have sucked about a fortnight: then they teach them to drink flet or skimmed milk, which they make just warm for them, it being very dangerous to give it them too hot. The best time for weaning of calves is from January to May. Let your calves have milk for about twelve weeks; only a fortnight before you wean them from milk, let water be mixed with the milk; and after your calf hath drank milk about a month, take some of the freshest, sweetest hay you have, and put little wisps of it into some cleft sticks, which place so as the calf may easily come at them to learn to eat; and after

Lady-day, when the weather is fair, turn your calves to graze, taking them in a few nights at first, giving them milk and water, and sometimes giving the same to them in a pail in the field, till you find they are able to feed themselves, so as not to desire it: but by no means let your graze be too rank, but short and sweet, that they may get it with some labour. All wean their calves at graze; for if you wean them in the house with hay and water, it is apt to make them big-bellied, and to rot; and when you have resolved which of the males to keep for bulls, let the others be gelt for oxen, which the sooner you do the better: when they are about ten or twenty days old, is the best time, and least dangerous.

CALIBER, or CALIPER, among engineers, &c. signifies the diameter of any body. Thus the caliber of a bullet, is the diameter of it.

CALIBER *Compasses*, the name of a particular instrument, for measuring the diameter of bullets, bombs, &c. They resemble other compasses, except in their legs, which are arched, in order that the points may touch the extremities of the object.

CALIPH, the supreme ecclesiastical dignity among the Saracens; or, as it is otherwise defined, a sovereign dignity among the Mahometans, vested with absolute authority in all matters relating both to religion and policy.

It signifies in the Arabick, successor or vicar: the Saracen princes assumed this title as descendants from Mahomet; the caliphs bearing the same relation to Mahomet, that the popes pretend they do to Jesus Christ or St. Peter. It is at this day one of the Grand Signior's titles, as successor of Mahomet; and of the Sophi of Persia, as successor of Ali.

CALIPPICK PERIOD, a period of seventy-six years, invented by Calippus, a famous Grecian astronomer, who observing that the cycle of Meton consisting of nineteen years, was not sufficient to calculate the phases of the moon, quadrupled the golden number, which produced a period of seventy-six years, at the end of which time he imagined the lunations would happen at the same hour, of the same day, of the same month, that they did seventy-six years before.

CALIX, or CALYX, in botany. See CALYX.

CALKINS, a name given in some parts of England, to a sort of horses shoes, made for frosty weather.

These shoes, by forcing the horse to tread wholly on the toes of his hind feet, are apt to occasion blymes, and ruin his back sinews. The farrier should therefore be ordered to pare the horn a little low at the heel, and turn down the sponge upon the corner of the anvil, so as to make the calkin resemble the point of a hare's ear, which will prevent the consequences often attending the common square calkin.

CALKING, in ship-building, the act of driving a quantity of oakum, *i. e.* old ropes untwisted and drawn asunder, into the seams of the planks, or into the intervals between the edges of the planks on a ship's decks or sides to keep out the water. After the oakum is driven very hard into these seams it is covered with hot-melted pitch to prevent the water from rotting it.

CALL, among seamen, implies a sort of whistle or pipe, used by the boatswain and his mates, to summon the men to their duty, and direct them in the various work of the ship, which they are taught to obey, by different strains of the call, as soldiers are directed to march, retreat, &c. by the drum.

CALLICARPA, in botany, a bacciferous shrub, which grows plentifully in the woods of Carolina; it rises from four to six feet high, sending out many branches from the side, which are woolly when young, and furnished with oval lanceolated leaves, placed opposite in pairs, and standing on pretty long footstalks; these are a little indented on their edges, their surface rough, and a little hoary. The leaves of this shrub are said to be used in dropical cases, with very good success.

CALLICO, in commerce, a kind of linen manufacture, made of cotton, chiefly in the E. Indies, some of which are painted with various flowers of different colours; and others that are never dyed, having a stripe of gold and silver quite through the piece; and at each end they fix a tiffue of gold, silver and silk, intermixed



termixed with flowers. This manufacture is brought hither by the E. India company, and is re-exported by merchants to other parts of Europe. The general wear of stained or printed India callicocs in this nation having become a general grievance, and occasioning unspeakable distress upon our own manufacturers, they were prohibited by stat. 7 Geo. I. cap. vii.

**CALLIGRAPHUS**, in antiquity, a copyist or scrivener, who transcribed, in a fair hand, what the notaries had taken down in notes, or minutes, being generally in a kind of cypher or short-hand, which, as they were in that hand, being understood by few, were copied over fair and at length by persons who had a good hand, for sale, &c.

**CALLING the house**, in the British parliament, is the calling over the members names, every one answering to his own, and going out of the house, in the order in which he is called: this they do, in order to discover whether there be any persons there not returned by the clerk of the crown; or if any member be absent without leave of the house.

**CALLOUS**, something partaking of the nature of a callus.

**CALLUS**, or **CALLOSITY**, among surgeons, a sort of jelly, formed about the edges of a fractured bone, and which secures them in the position they are placed in by the surgeon.

**CALLUS**, also signifies a hard, dense, insensible knob, arising on the hands, feet, &c. by hard work.

**CALM** in the marine language, that state of rest which appears in the air and sea when there is no wind stirring.

That tract of the Atlantick ocean, situated between the tropick of Cancer and the latitude of 29° north, or the space between the trade and variable winds, is frequently subject to calms of very long continuance; and hence it has justly acquired the name of the calm-latitude.

A long calm is often more fatal to a ship than the severest storm, if she is tight, and in good condition; as the provisions and water may be entirely consumed, where there may be no opportunity to obtain a fresh supply: at such a time the surface of the ocean is smooth and bright as a looking-glass.

**CALOGERI**, in ecclesiastical history, an order of monks of the Greek church.

**CALOMEL**, in the materia medica, a name given to mercurius dulcis, when it has been six times sublimed.

**CALOTTE**, a cap or coif of fatten or other stuff, worn by the popish ecclesiasticks, by way of ornament.

**CALOTTE**, in architecture, signifies a round cavity in the form of a cap or cup, lathed and plaistered.

**CALQUING**, or **CALKING**, the art of tracing any drawing, print, &c. upon some plate, paper, wall, &c. It is performed by covering the back side of the drawing with a black or red colour, and fixing the side so covered upon some piece of paper, waxed plate, &c. When this is done, every line in the drawing is to be traced over with a point, by which means the outlines of the drawing will be transferred to the paper or plate.

**CALTHA**, in botany, a genus of the polyandria polygynia class. It has no calix; there are five petals; and the capsules are many, containing a great number of seeds. There is but one species, viz. the palustris, or marsh-marygold, a native of Britain.

**CALTROP**, in military affairs, an instrument with four iron points, disposed in a triangular form, so that three of them are always on the ground, and the fourth in the air. They are scattered over the ground where the enemy's cavalry is to pass, in order to embarrass them.

**CALTROP**, in botany, the English name of the tribulus of botanists. See the article **TRIBULUS**.

**CALVARIA**, in anatomy, implies the uppermost part of the head or hairy scalp.

**CALVARY**, in heraldry, a cross so called, because it resembles the cross on which our Saviour suffered. It is always set upon steps.

**CALVINISTS**, in church-history, those who follow the opinions of Dr. John Calvin, one of the principal reformers of the church, in the XVIth century, a person of great parts and industry, and of considerable

learning; whose doctrinal system subsisted from the beginning, in the faith of God's elect people, and in the Sacred Scriptures, but which Calvin and Luther were the honoured instruments of retrieving. Calvinism, so to speak in compliance with custom, is said still to subsist in its greatest purity at Geneva. It is the prevailing religion of the United Provinces—In Scotland it is esteemed the only orthodox faith—And is beyond all doubt the Doctrine of the established church of England. (See a sermon entitled *Grace Triumphant*. Middleton.)

“John Calvin” says a learned historian, “was a man, whose memory will be blessed in every succeeding age. He instructed and enlightened, not only the church of Geneva, but also the whole Reformed World, by his immense labours. Inasmuch that all the Reformed churches are, in the gross, frequently called by his name.” (*Toplady's Historic Proof*.) Wherein is shewn, from the best authorities, how great a share this learned and pious man had in the reformation of the church of England; and also the remarkable candor with which he expressed himself, concerning the Ceremonies and Discipline of its religious establishment.

“The mention of Calvin,” (*Strype's Hist. Ref. under Qu. Eliz. chap. xxi. p. 246.*) “must bring in a very remarkable letter, which he wrote in the month of August this year [1561], concerning certain ecclesiastical rites, used in our office of private Prayer [an evident mistake for *Common-Prayer*] newly [re-] established [on the accession of Queen Elizabeth]: which were scrupled by some of the English exiles, upon their return; chiefly, because not used by the Reformed church in Geneva: concerning which, they had sent to Calvin, for his resolution and judgment. Wherein he gave his opinion generally in FAVOUR and approbation of them;” i. e. in favour of the Ecclesiastical Rites: which the historian particularizes in several instances. And then he adds:

“To this judgment of this great divine, concerning rites used in this church, I will briefly subjoin his approbation of the Episcopal government of the Church: which is alledged out of his *Institutions*, by Dr. *Whitgift*.

“That every Province [saith Calvin] had among their bishops, an archbishop; and that the council of Nice did appoint patriarchs, who should be, in order and dignity, above archbishops; was for the preservation of discipline. Therefore for this cause especially were those degrees appointed, that if any thing should happen, in any particular church, which could not be decided, it might be removed to a Provincial synod.—This kind of government some called Hierarchia: an improper name. But if, omitting the name, we consider the thing itself; we shall find, that these old bishops did not frame any other kind of government in the church, from that which the Lord hath prescribed in his word. And so much concerning Calvin's sense of our Church's Liturgy and Government.” *Toplady's Hist. Proof*.

**CALUMET**, a symbol of peace among the Indians of North America. It resembles our tobacco-pipes, but is much larger, and is adorned with fine feathers in the form of wings.

**CALX**, properly signifies lime, but is often used for the powder remaining after the calcination of metals.

**CALYCISTÆ**, an appellation given by Linnæus to those botanists who have classed plants according to the different structure of the calyx, or cup of the flowers; such was Magnolius.

**CALYPTRA**, or veil, a term given by botanists to a peculiar kind of calyx; being a thin membranaceous involucre, usually of a conick figure, and covering the stamina, and other parts of fructification: the capsules of most of the mosses have calyptræ.

**CALYX**, among botanists, signifies the cup of a flower; this is the termination of the cortex, or outer bark of plants, which, after accompanying the trunk or stem through all its branches, breaks out with the flower, and is present in the fructification; in this new form its chief use is to inclose and protect the other parts.



parts. The calyx has received different appellations, according to the circumstances with which it is attended, and on that account distinguished by several names, as perianthium, involucre, amentum, spatha, gluma, calyptra, and volva. See the articles PERIANTHIUM, &c.

That the calyx is a part of the flower, (though it often attends the fruit) is manifest from hence, that there is no instance of its coming out after the plant has done flowering. The calyx is also called the empalement of the flower.

CAMÆA, in natural history, one of the semi-pellucid gems, formed of zones on a crystalline base, like the onyx, but more debased with earth.

CAMALDULIANS, in ecclesiastical history, a religious order founded by St. Romauld, in the little plain of Camalduli, and Mount Apennine.

CAMBER-DECKED, among shipwrights, implies a deck formed in a rounding manner, the middle lying much higher than the sides.

CAMAYES, a species of cotton cloth, made at Bengal in the E. Indies.

CAMBLET, or CAMLET, a sort of stuff, of which the warp is of hair, and the woof half hair and half silk.

CAMBRICKS, a species of very fine and beautiful linen, made at Cambray, in the French Netherlands.

CAMEL, in natural history, a large quadruped, used in the eastern countries as a beast of burden. It has a single bunch upon its back, and is covered with a fine fur, shorter, as well as softer than that of the ox kind.

CAMELOPARDALIS, in astronomy, the name of a new constellation in the northern hemisphere, formed by Hevelius, and consisting, according to his catalogue, of thirty-two stars; but since his time many more have been observed, and their places settled, so that in the British catalogue, this constellation consists of fifty-six stars.

CAMERA OBSCURA, in opticks, a machine for exhibiting the picture of a landscape, &c. in its natural colours.

The camera obscura, or darkened chamber, is made after two different methods; one is the camera obscura, or darkened chamber at large; that is, any large room or chamber made as dark as possible, so as to exclude the light in every part except a small circular hole in the window shutter, where a lens fixed in a ball is placed. The other camera obscura is small; and thence often called a portable camera obscura, from its being carried from place to place, for taking a perspective view of any proposed place or part of the country.

Plate XIV, exhibits both sorts of these darkened chambers.

The upper compartment of the plate represents a terrace, on which are placed two portable machines of this kind.

Fig. 1. is a portable camera obscura, in the form of a sedan chair, having a door behind. A, a small square turret, in which a mirror is placed. B, the mirror, either of glass or metal. C, the tube in which the lens is fastened. D, the table on which the designer lays his paper to receive the images of the objects. E, the designer's seat. F, F, ledges of wood for strengthening and darkening the machine. G, G, G, other ledges fastened to the door, in order to exclude the light when the door is shut.

Fig. 2. Another camera obscura, more portable than the former, in the form of a pavilion; it is placed upon a table, which is no part of the machine. It has the same use, and the apparatus on the top is the same as in the other.

Fig. 3. represents the large camera obscura, where A B C D is the prospect of a house, trees, &c. E F, a darkened room, or camera obscura; on one side is the picture G H, of the above view, inverted, formed by a convex lens in a ball fixed before a hole in the opposite side I K at V.

CAMISADE, in military affairs, implies an attack by surprize, either during the night, or at break of day, when the enemy is supposed to be asleep.

CAMOMILE. See the article CHAMÆMILUM.  
CAMP, in military affairs, the whole space or extent of ground, in general, occupied by an army when it is in the field, and upon which all its baggage is lodged.

In a siege, the camp is placed all along the circumvallation, at one hundred and twenty fathoms distant from the line; the army faces the circumvallation, that is, the soldiers have this line before them and the town behind.

The line which terminates the camp on the side of the circumvallation, is called the head of the camp, and that which terminates it on the side of the town, is the tail, or rear of the camp.

Flying CAMP, the ground on which a flying army is encamped.

CAMPAIGN, in military affairs, implies the space of time an army keeps the field.

CAMPANULATED, or CAMPANIFORM, among botanists, is an epithet applied to flowers resembling a campana, or bell.

CAMPANULA, bell-flower, in botany, a genus of plants ranged by Linnæus among the pentandria monogynia, and of which there are several species. The flowers consist of a single campanulated petal, divided at the edge into five broad, acute, and petalous segments. The nectarium is situated in the bottom of the corolla, and is formed of five acute connivent valves. The seeds which are contained in a small columnar receptacle, are small and numerous.

CAMPEACHY-WOOD, or Log-wood. See the article HÆMATOXYLUM.

CAMPHOR, or CAMPHIRE, a solid concrete juice extracted from the wood and roots of the laurus camphora, which grows in Japan. The camphor is extracted in the same way by which we extract essential oils. As it first sublimes from the wood, it appears brownish, composed of semipellucid grains mixed with dirt. In this state it is exported by the Dutch, and purified by a second sublimation; after which it is reduced to loaves, probably by fusion in close vessels, and in this form it is sold to us. Pure camphor is very white, pellucid, somewhat unctuous to the touch; of a bitterish aromack, acrid taste, yet accompanied with a sense of coolness. It has a fragrant smell, somewhat like that of rosemary, but much stronger. It is totally volatile and inflammable; soluble in vinous spirits, oils, and mineral acids; but not in water, alkaline liquors, or the vegetable acids. Camphor is esteemed one of the most efficacious diaphoreticks, and has long been celebrated in fevers, malignant and epidemical distempers. In deliria, where opiates fail of procuring sleep, this medicine frequently succeeds.

Artificial CAMPHOR, is prepared with gumi-sandarach and white vinegar distilled, kept twenty days in horse-dung, and afterwards exposed a month to the sun to dry, at the end of which the camphor is found in form of the crust of a white loaf. This is also called juniper-gum, and mastich.

Camphor may probably be extracted from all plants, which abound with an essential oil; yet it would differ with regard to the smell, always retaining that of the tree from which it is extracted.

CAMPHORATED, any thing impregnated with the virtues of camphor.

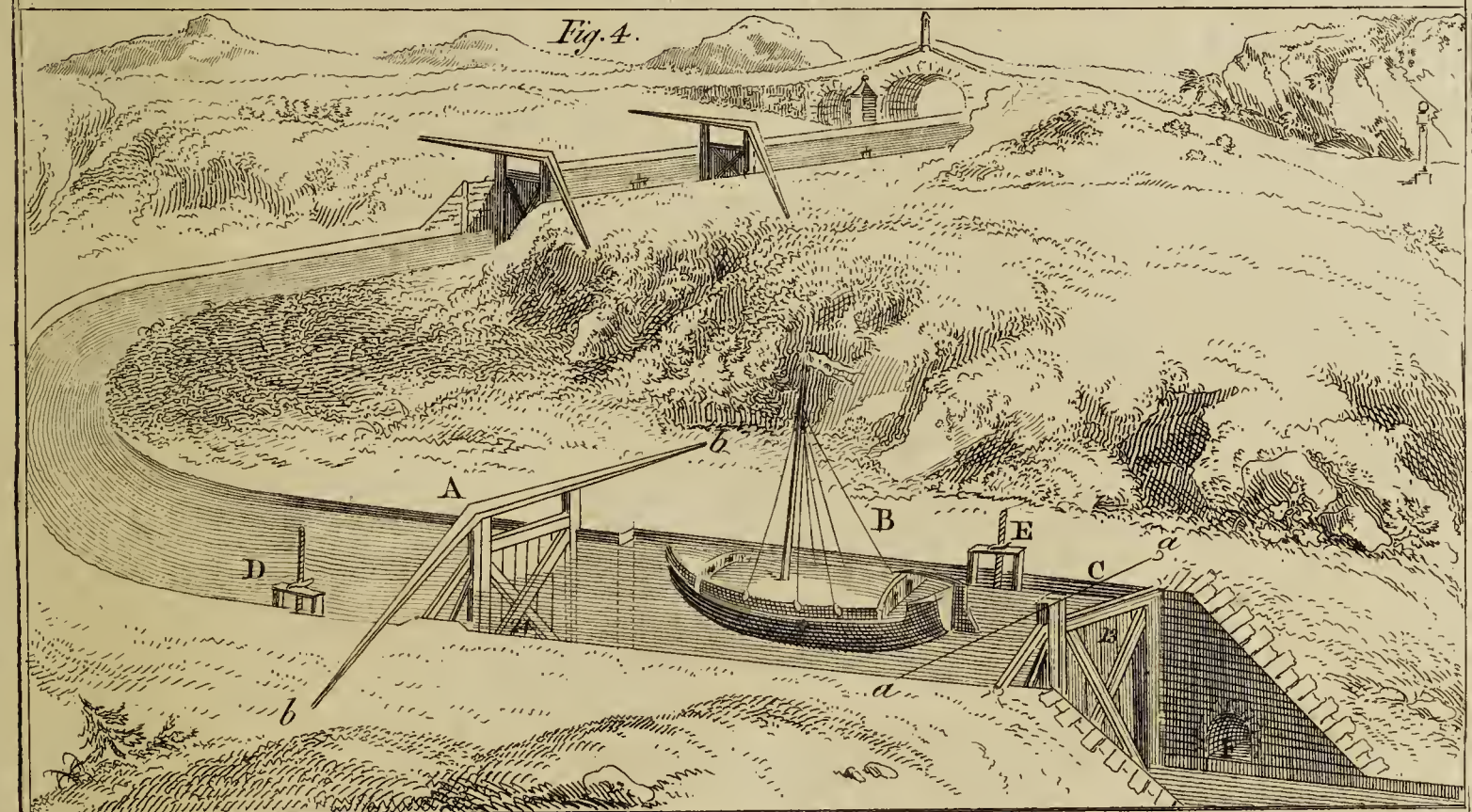
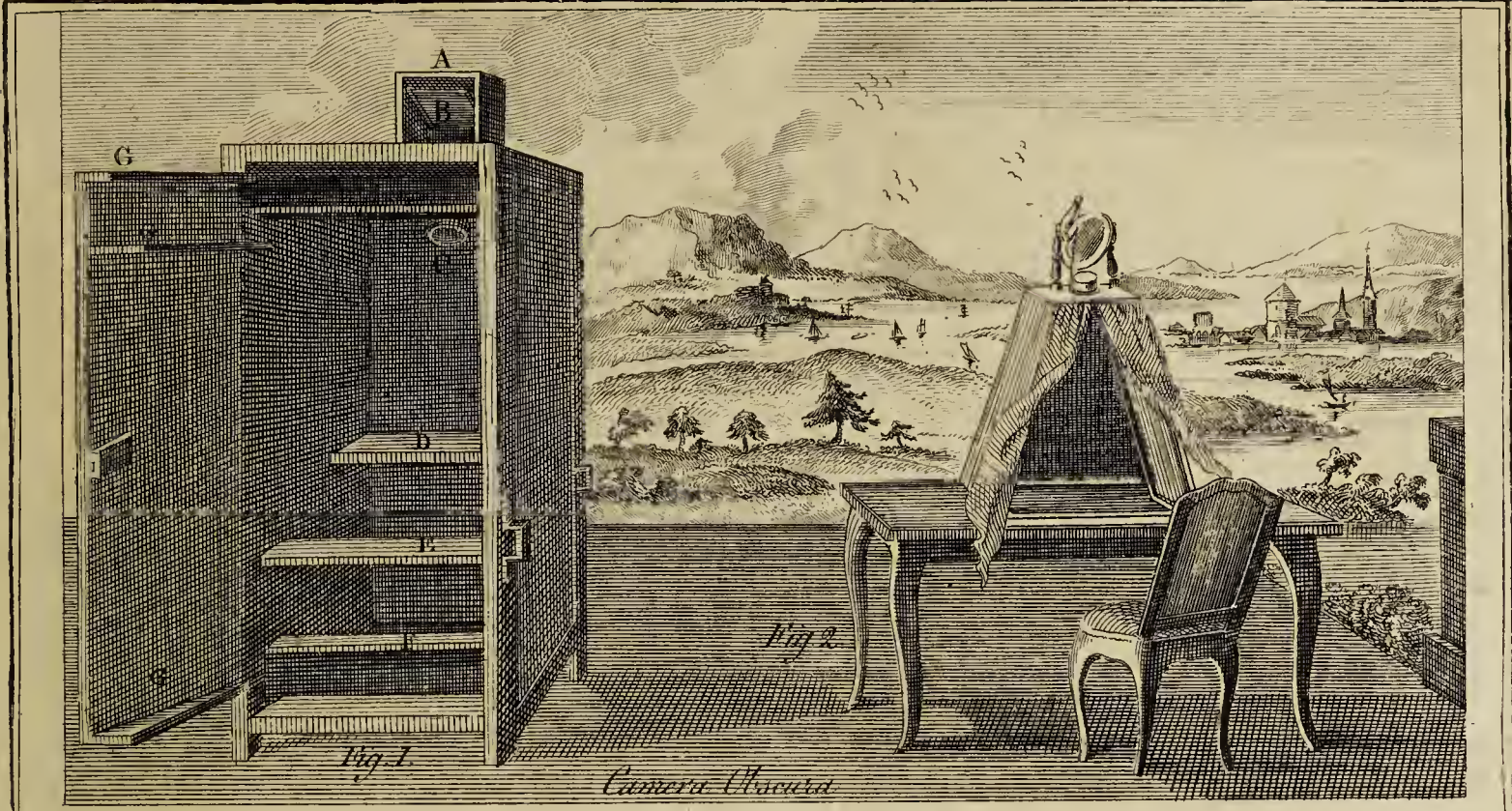
CAMPION, in botany, a name given by some writers to the lychnis.

CAMPUS, in antiquity, a space of ground left upon any buildings in cities and large towns, resembling what we call a square.

CANAL, *canalis*, in hydrography, a kind of artificial river, made for the convenience of water-carriage.

The Dutch, or if we can believe the relations of travellers, the Chinese, who inhabit a country vastly more extensive than that of the Dutch, have shewn the great advantages resulting from canals to a trading people. The ancients often took great pains to make a communication, by water, from one place to another. Several of the kings of Egypt have endeavoured to join the Red-sea with the Mediterranean, by a canal opened from the Red-sea to one of the arms of the Nile, which











which discharges itself into the Mediterranean; and the Turkish Solyman II. employed 150,000 men upon this business to no purpose.

There are several large canals in France; that of Briere, begun under Henry IV. and finished under Lewis XIII. establishes a communication between the Loire and the Seine by the Loing. There are forty-two sluices upon it. But the greatest and most wonderful work of that kind, and at the same time one of the most useful, is, the junction of the two seas, by the canal of Languedoc, proposed under Francis I. but not finished till the time of Lewis XIV. *Plate XIV. fig. 4.* is a perspective view of part of a navigable canal, in which are two locks.

A, the upper gates of the lock, C the lower, and the distance between A and C the basin of the lock.

a, a, two levers for opening the lower gates C, which separate at 13.

b, b, the levers which open the upper gate A.

B, a vessel in the lock.

D, E, F, sluices for letting the water out of the canal when there is too great a quantity.

When a vessel, or barge approaches the lock, the lower gates C are opened, and also the sluice at E, the gates at A being kept close shut, by this means the water in the basin sinks down to a level with those in the lower part of the canal. The vessel then proceeds upwards, and enters the basin of the lock, when the gates at C, as well as the sluice at E, are shut, and the gates at A opened. The consequence of which is, the water in the basin rises up to a level with that in the upper part of the canal, lifting the vessel with it. The vessel then proceeds through the upper gates, which are then shut, and the basin ready for the reception of another vessel. And in this manner vessels pass along navigable canals, notwithstanding the rising and falling of the ground with very little trouble.

CANAL, in anatomy, a duct or passage, through which any of the fluids pass.

CANAL of the *Larmier*, in architecture, the hollowed platfond or soffito of a cornice, which forms the pendant mouchette.

CANAL of the *Volute*, in the Ionick capital, implies the face of the circumsolutions inclosed by a listel.

CANICULATED, or CANICULATE, an epithet applied by botanists, to the leaves and stalks of plants, hollowed in the manner of a canal.

CANARY-BIRD, the name of a bird, now well known in England, originally imported from the Canary Islands; they are however now bred in England, Germany, France, and most other nations of Europe.

CANARY-SEED, the name of a small seed produced by a graminaceous plant, cultivated in most parts of Europe, especially in the Isle of Thanet.

CANCER, the crab, in zoology, the name of one of the divisions of squillæ, comprehending all those with short tails.

Crabs are a well known shell-fish, of which there are a great many species; as the common large crab, the spider-crab, the Molucca-crab or king-crab, the little wooly-crab, the prickly long-armed-crab, &c.

CANCER, in surgery, a roundish unequal hard livid tumour, generally seated in the glandulous parts of the body, and at length appearing with turgid veins, shooting out from it so as to resemble, as it is thought, the figure of the crab-fish, or, as others say, because like that fish, when once it has got hold, it is scarce possible to drive it away.

Cancerous, or scirrhus tumours, often appear spontaneously without any evident cause, and seem peculiar to certain constitutions; at others, they may be accidental, or proceed from sharp, corrosive or other coagulating juices in the body, errors in the non-naturals, a stoppage of the necessary evacuations, contusions, stagnation, or coagulation of the milk in the breast, &c. The immediate cause of a cancer seems to be a too corrosive volatile salt, approaching to the nature of arsenick, formed by the stagnation of humours, &c. Stolterfoth observes, that it has been frequently cured by mercury and salivation. Some take an ulcerous cancer to be nothing else but an infinite number of little

worms, which devour the flesh by degrees. The cancer is allowed to be the most terrible evil that befalls the body; it is usually cured while yet a small tumour of the bigness of a nut, or at most a small egg, by extirpation; when it seizes the breast, or is burst into an ulcer, amputation takes place. It begins without any pain, and appears at first like a chicory pea, but grows apace, and becomes very painful. The cancer arises principally on the lax and glandulous parts, as the breasts and emunctories: it is most frequent in women, especially such, says Stolterfoth, as are barren, or live in celibacy. The reason of its appearing in the breasts, more than other parts, is, they being full of glands, with lymphatics and blood vessels among them, the smallest contusion, compression, or puncture, extravasates those liquors, which grow by degrees acrimonious from the cancer. Hence the masters of the art say, that a cancer is that in the glands, which a caries is in the bones, and a gangrene in the fleshy part.

The cancer is, however, found in other soft spongy parts of the body; and there have been some found in the gums, belly, neck of the matrix, ureters, lips, nose, cheeks, abdomen, thighs, and even the shoulders, as Stolterfoth proves. A cancer arising on the leg is called a lupus; or on the face or nose, a noli me tangere. Cancers are divided, according to their several stages, into occult and open, or ulcerated: occult cancers are those not arrived at their state, or not yet burst; ulcerated cancers are known by their roughness and fulness of holes, through which oozes a filthy stinking glutinous matter, frequently yellowish; by their pungent pain, which resembles the pricking of pins; by their blackness, the swelling of the lips of the ulcer, and the veins about it, which are blackish, tumid, and varicose; sometimes the extremities of the blood-vessels are gnawed off, and the blood issues out; in a cancer of the breast the adjacent flesh is sometimes so consumed, that one may see into the cavity of the thorax; it occasions a slow fever, a loathing, oftentimes faintings, sometimes a dropsy, and lastly death.

Some cancerous tumours are moveable, others fixed; some inflamed, others palish, and attended with pain, heat, tension, and pulsation. In their beginning they are sometimes no bigger than a pea, but often increase gradually to the size of a walnut, egg, &c. sometimes also their growth is sudden, and at others slow, so as to continue upon the increase many years together. When they ulcerate, the suppuration is generally partial, the matter they discharge seeming of an ill-colour, and very foetid.

All cancers are dangerous, and seldom give way to the use of evacuating medicines, especially when they lie deep, or seem owing to a particular constitution of the patient. They also prove more difficult to cure, according to their size, the nature and office of the part they affect, the age of the patient, &c. Some occult cancers, particularly those which happen in the breasts of women, may remain harmless to the body for several years, and without ulcerating: though upon any external injury, they may afterwards increase, break, and soon prove mortal. In this case, every thing that suddenly raises the velocity of the blood should be carefully avoided.

The learned Dr. Stork, of Vienna, has published two pieces on the virtues of cicuta, or hemlock, in cure of cancers, and given many remarkable cases in which it was attended with success. Experiments of the same kind have also been made in England, some of which have succeeded, while others have totally failed of success: so that the virtues of hemlock in curing this terrible disease are not yet properly established. See the article CICUTA.

CANCER, in astronomy, one of the twelve signs of the zodiack, represented on the globe in the form of a crab, (*plate IV. fig. 4.*) and thus marked, ♋, in books. Ptolemy makes it contain only 13 stars; Tycho Brahe 15; Bayer and Hevelius 29; and Flamsteed no less than 71. It is the fourth sign, reckoning from aries, and gives name to one of the quadrants of the ecliptick.

Tropick of CANCER, in astronomy, a lesser circle of



the sphere parallel to the equator, and passing through the beginning of the sign cancer.

**CANCEROUS**, something belonging to, or partaking of, the nature of a cancer. See **CANCER**.

**CANDIDATE**, a person who aspires to some public office.

**CANDLE**, a small taper of tallow, wax, or spermaceti; the wick of which is commonly of several threads of cotton, spun and twisted together.

A tallow-candle, to be good, must be half sheep's, and half bullock's tallow; for hog's tallow makes the candle gutter, and always gives an offensive smell, with a thick black smoke. The wick ought to be pure, sufficiently dry, and properly twisted, otherwise the candle will emit an unconstant vibratory flame, which is both prejudicial to the eyes, and insufficient for the distinct illuminations of objects.

There are two sorts of tallow-candles; the one dipped, the other moulded: the former are the common candles; the latter are the invention of the Sieur le Brege, at Paris,

As to the method of making candles, in general, after the tallow has been weighed, and mixed in the due proportions, it is cut into very small pieces, that it may melt the sooner; for the tallow in lumps, as it comes from the butchers, would be in danger of burning or turning black, if it were left too long over the fire. Being perfectly melted and skimmed, they pour a certain quantity of water into it, proportionable to the quantity of tallow. This serves to precipitate to the bottom of the vessel the impurities of the tallow which may have escaped the skimmer. No water, however, must be thrown into the tallow designed for the three first dippings; because the wick, being still quite dry, would imbibe the water, which makes the candles crackle in burning, and renders them of bad use. The tallow, thus melted, is poured into a tub through a coarse sieve of horse-hair, to purify it still more, and may be used after having stood three hours. It will continue fit for use twenty-four hours in summer, and fifteen in winter.

The wicks are made of spun cotton, which the tallow-chandlers buy in skains, and which they wind up into bottoms or clues: whence they are cut out with an instrument contrived on purpose, into pieces of the length of the candle required; then put on the sticks or broches, or else placed in the moulds, as the candles are intended to be either dipped or moulded. Wax-candles are made of a cotton or flaxen wick, slightly twisted, and covered with white or yellow wax. Of these, there are several kinds; some of a conical figure, used to illuminate churches, and in processions, funeral ceremonies, &c.

*Sale or Auction by Inch of CANDLE*, is when a small piece of candle being lighted, the bystanders are allowed to bid for the merchandize that is selling; but the moment the candle is out, the commodity is adjudged to the last bidder.

There is also an excommunication by inch of candle, when the sinner is allowed to come to repentance while a light candle continues burning; but after it is consumed, he remains excommunicated to all intents and purposes.

*Method of making mould CANDLES*. These candles are made in moulds of different matters; brass, tin, and lead, are the most ordinary. Tin is the best, and lead is the worst. Each candle has its mould, consisting of three pieces, the neck, shaft, and foot: the shaft is a hollow metal cylinder, of the diameter and length of the candle proposed; at the extremity of this is the neck, with a little metallick cavity, in form of a dome, having a moulding within-side, and pierced in the middle with a hole big enough for the wick to pass through. At the other extremity is the foot, in form of a little tunnel, through which the liquid tallow runs into the mould. The neck is soldered to the shaft, but the foot is moveable, being applied when the wick is to be put in, and taken off again when the candle is cold. A little beneath the place where the foot is applied to the shaft, is a kind of string of metal, which serves to support that part of the mould, and to prevent the shaft from entering too deep in the table to be mentioned here-

after. Lastly, in the hook of the foot is a leaf of the same metal, soldered within-side, which, advancing into the centre, serves to keep up the wick; which is here hooked on precisely in the middle of the mould. The wick is introduced into the shaft of the mould, by a piece of wire, which, being thrust through the aperture of the hook, till it comes out at the neck, the wick is tied to it; so that in drawing it back, the wick comes along with it, leaving only enough at the top for the neck; the other end is fastened to the hook, which thus keeps it perpendicular. The moulds, in this condition, are disposed in a table pierced full of holes, the diameter of each being about an inch: these holes receive the moulds inverted, as far as the string in the foot. Being thus placed perpendicularly, they are filled with melted tallow, (prepared as before) drawn out of the tap into a tin-pot, and thence poured into the foot. After the moulds have stood long enough to cool, for the tallow to have arrived at its consistence, the candle is taken out, by taking off the foot, which brings the candle along with it.

**CANDLE-BERRY-TREE**, the English name from a species of myrtle common in Virginia, and other parts of the British colonies in America. It has its name from a sort of green wax, extracted from the berries by boiling, and of which they make candles.

**CANDLEMAS-DAY**, a festival observed on the second of February, in honour of the purification of the Virgin Mary; and so called from the great number of lights used by the early ages of Christianity, both in their churches and processions.

**CANDY**, or *Sugar CANDY*, sugar dissolved, and crystallized. But the operation is repeated if the sugar candy be desired fine and transparent. The red sugar-candy is made from the Muscovado sugar, the yellow from the Cassanado, and the white from the loaf-sugar.

**CANDYING**, the art of preserving fruits, &c. by boiling them in sugar.

**CANELLA ALBA**, white cinnamon, in the materia medica, the inner bark of a species of a large tree, growing in the swampy parts of Jamaica, and other parts of the West-Indies. It has a spicy and agreeable smell, a pungent taste, and is often substituted for winter's bark, which it nearly resembles in its virtues.

**CANES VENATICI**, the two hounds, in astronomy, a new constellation of the northern hemisphere, consisting of 25 stars. These two hounds are represented on the globe, coupled together by the neck, and with a string by Bootes.

**CANICULA**, the little dog, in astronomy, the same with canis minor. See the article **CANIS MINOR**.

**CANICULAR-DAYS**, or dog days, the interval of time, during which the sun passes through the constellation Canis major, or when the great dog-star or Sirius, passes the meridian with the sun. The ancient astronomers, who gave this interval the name of dog-days, were persuaded, that the great heat usually felt at that time of the year, was owing to the rising and falling of the dog-star with the sun. A very absurd supposition, for in time this will not happen till the middle of winter.

**CANICULAR YEAR**, among the ancient Egyptians, was the interval of time between the heliacal rising of Sirius one year, and that of the next. It was their civil year, and consisted of 365 days, 6 hours.

**CANINE**, in a general sense, implies any thing that partakes of the nature of a dog, or has any relation to that animal.

**CANINE MUSCLES**, a pair of muscles common to both lips. See the article **MUSCLES of the Human Body**.

**CANINE-TEETH**, in anatomy, are two sharp-edged teeth in each jaw, placed on each side between the incisors and molares.

**CANIS**, the dog, in zoology, a well known, and very comprehensive genus of quadrupeds.

**CANIS MAJOR**, the great dog, in astronomy, a constellation of the southern hemisphere, consisting, according to Ptolemy's catalogue, of 28 stars; according to that of Tycho, of 13; but Mr. Flamsteed has enumerated 31. Among them is a famous star, of the first magnitude, called Sirius, or the great dog star.

**CANIS MINOR**, the little dog, in astronomy, a constellation











stellation of the northern hemisphere, consisting in Ptolemy's catalogue of only 2 stars; in that of Tycho of 5, and in that of Mr. Flamsteed of 14. Among these is a remarkable star, of the first magnitude, called Procyon, or the little dog star.

CANKER, among surgeons, implies a speck, occasioned by a sharp acrid humour, very common in the mouths of children.

CANKER, among farriers, a small speck, occasioned by some corrosive humour.

This distemper often attacks the foot of a horse, and generally proceeds from thrushes, when they prove rotten and putrid, though many other causes may produce this disorder. The method used by farriers for the cure is generally with hot oils, such as vitriol, aqua fortis, and butter of antimony, which are very proper to keep down the rising flesh, and should be used daily till the fungus is suppressed, when once in two days will be sufficient, strewing red precipitate powder over the new grown flesh, till the sole begins to grow.

There is one great error committed often in this cure, which is, in not having sufficient regard to the hoof; for it should not only be cut off, wherever it presses upon the tender parts, but should be kept soft with linseed oil; and as often as it is dressed, bathe the hoof, all round the coronet, with chamber-lye. Purging is very proper to complete the cure. *Bartlett's Farriery*, p. 314.

CANKER, a disease incident to trees, proceeding chiefly from the nature of the soil. It makes the bark rot and fall. If the canker be in a bough, cut it off; in a large bough, at some distance from the tree; and in a small one, close to it: But for over-hot strong ground, the mold is to be cooled about the roots with pond mud, and cow-dung.

CANNA, in botany, a genus of plants, ranged by Linnæus, among the monandria-monogynia. The flower is monopetalous, and divided at the edge into six parts. The fruit is a roundish capsule divided into three cells, each containing several globose seeds.

CANNABIS, hemp, in botany. See HEMP.

CANNEL-COAL, a bituminous mineral, found in several parts of England, particularly in Lancashire, where it is burnt as common fuel; though it is often worked up into toys, and utensils of various kinds, and sold under the name of jet, with which it has often been confounded.

CANNEQUINS, a species of cotton-linens, imported from the E. Indies, and principally used in the Guinea trade.

CANNON, a military engine for throwing balls, &c. by the help of gunpowder.

The invention of brass cannon is ascribed, by Larrey, to J. Owen, who says, that they were first known in England in the year 1535; but yet acknowledges that in the year 1346 there were four pieces of cannon in the English army; at the battle of Cressy; and that these were the first that were known in France. And Mezeray relates, that king Edward, by five or six pieces of cannon, struck terror into the French army, it being the first time they had seen such thundering machines.

The matter of which cannons are made is metal, either iron or brass, or rather a mixture of copper, tin, and brass. The mixture of tin is designed to make the metal more compact and dense; so that the heavier the copper is, the less tin it requires. It is usual to add eight pounds of brass and ten pounds of tin to one hundred pounds of copper; but sometimes they use ten pounds of tin, ten pounds of lead, and five pounds of brass.

The Swedes, during the long war in the last century, are said to have used cannons made of leather; but these were too apt to burst to be of any great service.

The parts and proportions of cannon about eleven feet long, are, the barrel or cavity nine feet, its fulcrum or support fourteen; and its axis seven; the diameter of the bore at the mouth six inches two lines; the plug of the ball two lines; the diameter of the ball therefore six inches, and its weight thirty-three  $\frac{1}{2}$  pounds; the thickness of the metal about the mouth two inches, and at the breech six; the charge of powder from eighteen to twenty pounds. It will carry a point-blank six hun-

dred paces, and may be loaded ten times in an hour, and sometimes fifteen.

Cannons are distinguished by the diameters of the balls they carry. The rule for their length, &c. is, that the whole charge of powder be on fire before the ball quit the piece. If it be made too long, the quantity of air to be driven out before the ball, will give too much resistance to the impulse: and that impulse ceasing, the friction of the ball against the surface of the piece will lessen its velocity.

Formerly cannon were made much longer than they are at present; but some being, by chance, made two feet and a half shorter than ordinary, it was found that they threw a ball with a greater impetus through a less space than the larger. This was confirmed by Gustavus Adolphus in the year 1624; an iron ball of 48 pounds weight being found to go further from a new short cannon, than another ball of 96 pounds out of a longer piece; whereas in other respects it is certain the larger the bore and ball, the greater the range.

The greatest range of a cannon is ordinarily fixed at 45° but Dr. Halley shews it to be at 44  $\frac{1}{2}$ . M. S. Julien adjusts the ranges of the several pieces of cannon, from the weight of the ball they bear, the charge of powder being always supposed to be in a subduplicate ratio to the weight of the ball.

Weight of a Lead Ball.	Horizontal Range.	Greatest Range.
lb.	Paces.	Paces.
33	600	6000
24	700	6000
16	800	8000
12	450	5000
8	400	1500
6	150	1500

Experience has shewn, that two cannons being of equal bore, but different lengths, the longer requires a greater charge of powder than the shorter. The ordinary charge of cannon is to have the charge of its powder half that of its ball.

The names of the several cannon, their length, weight, and that of their balls, as they obtain among us, are as in the following table:

Names of Cannon.	Wt. of an Iron Ball.		Wt. of the Cannon.	Length of the Cannon.	
	lb.	oz.	lb.	Feet	Inch.
Cannon royal	48	0	8000	12	0
Demi cannon large	36	0	6000	12	0
Demi cannon ordinary	32	0	5600	12	0
Demi cannon least	30	0	5400	11	0
Culverin largest	20	0	4800	12	0
Culverin ordinary	17	5	4500	12	0
Culverin least	15	0	4000	11	0
Demi culverin ordinary	10	11	2700	11	0
Demi culverin least	9	0	2000	10	0
Saker ordinary	6	0	1500	10	0
Saker least	4	12	1400	8	0
Minion largest	3	12	1000	8	0
Minion ordinary	3	4	800	7	0
Falcon	2	8	750	6	0
Falconet	1	5	400	5	6
Rabinet	0	8	300	5	6
Base	0	5	200	4	6

Cannons are made cylindrical, that the motion of the ball may not be retarded in its passage, and that the powder, when on fire, may not slip between the ball and the surface of the cannon, which would hinder its effect.

Wolfius would have the cannon always decrease as it goes towards the mouth or orifice; because the force of the powder always decreases in proportion to the space through which it was expanded.

The new cannon, that are made after the Spanish manner, have a cavity or chamber at the bottom of the barrel, which helps their effect.



A cannon is found to recoil two or three paces after the explosion, which by some is accounted for from the air's rushing violently into the cavity as soon as the ball has been discharged; but the real cause is, the powder's acting equally upon the breech of the cannon and the ball. The plate annexed will sufficiently explain the various terms given to the different parts of a piece of ordnance.

#### Explanation of plate XV.

*Fig. 3.* represents a twenty-four pounder, or a cannon which carries a ball of twenty-four pounds. A, the cascabel or pummel. B, the breech or coil. C, the field of the touch-hole. D, the base ring. E, first reinforcement. F, reinforced ring. G, second reinforcement. H, handles in the form of dolphins for the more easily mounting or dismounting the piece. I, I, the trunnions. K, the trunnion ring. L, the ornament of the chase. M, band of the ornament. N, the chase. O, the cornish ring. P, the cornish. Q, the muzzle ring. R, the mouth. S, the touch-hole.

*Fig. 4.* a longitudinal section, by a horizontal plane of the same piece, in order to shew the thickness of the metal from the breech to the muzzle. The two dotted parallel lines in the middle of the figure, shew the bore or chase of the cannon. *ab*, the little chamber, or the canal of communication between the chamber of the piece and touch-hole.

*Fig. 5.* a longitudinal section by a vertical plane. The parts marked *e, e*, shew the thickness of the metal from the breech to the muzzle. *f*, the cavity, or bore of the piece. *db*, the little chamber. *cd*, the touch-hole, which is drilled through a mass of pure copper. The mass is represented by the shaded part *abc*.

*Fig. 6.* a cannon mounted upon its carriage. M, the cheek or after-train of the carriage.

*Fig. 7.* represents the manner of drawing pieces of artillery from one place to another. A, the after-train of the piece. B, the fore-train. The two trains are connected together by means of an iron pin fixed perpendicularly in the fore-train, and passing through a pole in the after-train.

**CANNULA**, in surgery, a tube made of different sorts of metals, but generally of silver, in order to be introduced into hollow ulcers, to facilitate a discharge of the pus, or other substances.

**CANOE**, a sort of boat or vessel used among the Indians, formed out of the trunk of a tree, or composed of several pieces of bark sewed together.

Canoes are of various sizes, according to the countries where they are formed, or the use for which they may be designed: the largest are made of cotton tree, some of which will carry between twenty or thirty hog-heads of sugar or molasses: some are made to carry sail, and for this purpose are steeped in water till they become pliant, and then their sides are extended with strong beams, on which a deck is afterwards laid. The other sorts very rarely carry sail, unless when going afore the wind; their sails, for this purpose, are sometimes made of a kind of rushes or silk grass. They are very commonly rowed with paddles, which are pieces of light wood, somewhat resembling a corn-shovel; and instead of wielding the paddle horizontally, like an oar, they row perpendicularly. The small canoes are very narrow, having only room for one person in breadth, and eight or nine lengthways.

**CANON**, in ecclesiastical affairs, implies a person who possesses a revenue for performing divine service in some cathedral or collegiate church.

**CANON**, also implies a law, rule, or regulation of the policy or discipline of the church, made by some general, national, or provincial council.

**CANONS of the Apostles**, a collection of very ancient ecclesiastical laws, though not left us by the Apostles.

**CANON of Scripture**, a catalogue or list of the inspired writings, or such books of the bible as are called canonical; because they are in the number of those books which are looked upon as sacred, in opposition to those which are either not acknowledged as divine books, or are rejected as heretical and spurious, and are

called apocryphal. This canon may be considered as Jewish and Christian; with respect to the sacred writings acknowledged as such by the Jews, and those admitted by the Christians.

**CANON**, in musick, a short composition of two or more parts, in which one leads and another follows.

**CANON**, in mathematicks, implies a rule for solving all questions of the same nature. These rules or canons are generally taken from the last step of an algebraical process for solving any question, as that step will solve all similar questions.

**CANON-LAW**, a collection of ecclesiastical laws, by which the church is governed.

**CANONESS**, in the Romish church, implies a woman who enjoys the revenue of a canon, without being obliged to renounce the word, or make any vows.

**CANONICAL**, something relating to the canons of the church, or agreeable to their intention.

**CANONIZATION**, a pompous ceremony in the church of Rome, whereby one is ranked in the catalogue of the saints. It succeeds beatification. See the article **BEATIFICATION**.

**CANONRY**, the benefice enjoyed by a canon.

**CANOPUS**, in astronomy, a star of the first magnitude in the rudder of Argo, a constellation of the southern hemisphere.

**CANQUE**, a kind of cotton cloth made in China.

**CANTALIVERS**, in architecture, are pieces of wood framed into the front and sides of a house to support the mouldings and eaves projecting over it.

**CANTAR**, or **CANTARO**, in commerce, the name of a weight used in Italy, particularly at Leghorn, for weighing heavy commodities. There are three sorts of cantars, the first is 150, the second 151, and the third 160 pounds avoirdupois weight.

**CANTATA**, in musick, implies a vocal piece, intermixed with recitatives, airs, and different movements.

**CANTERBURY BELL-FLOWER**, in botany, the English name for a species of the campanula. See the article **CAMPANULA**.

**CANTHARIS**, in zoology, a genus of four-winged flies, with setaceous antennæ, the exterior wings of which are flexible, the thorax somewhat flattened, and the sides of the abdomen plicated.

The cantharis, though usually called Spanish fly with us, is properly of the scarabæus, or beetle-kind; the creature is usually about half an inch in length, and a third of an inch, or somewhat less, in breadth: it is of a fine shining and beautiful colour, on the upper side a bright green, with a mixture or shadow of gold-yellow.

From the eggs of the parent cantharis, are hatched a small kind of worms, of a dusky colour, with six legs; and from these worms are afterwards produced the cantharides, as the butterflies are from the caterpillars: they are frequent in France, Spain, and Italy, where being taken, and suspended over the fumes of vinegar, they are exposed to the sun to dry, and then sold to the druggist.

The principal use of the cantharides, at this time, is external, in making of blisters. We have a tincture of cantharides in the shops, that is reputed an excellent medicine. It is diuretick, and emmenagogue, and has been given in the gout with success.

To prepare the tincture of cantharides, take two drams of bruised cantharides, half a dram of cochineal, a pint and a half of proof spirit; digest them together in a sand-heat, then filter the tincture for use.

**CANTICLES** a canonical book of the Old Testament, written by Solomon, in the form of an idyllium or pastoral.

**CANTO**, in poetry, implies the division of a poem.

**CANTO**, in musick, is the treble, or highest part of a piece.

**CANTON**, in geography, implies a small country or district, constituting a distinct government.

**CANTONED**, among architects, is a term applied to the corner of a building when it is beautified with pilaster, angular column, or any other ornament, that projects beyond the wall.



CANTONED, in heraldry, implies the position of such objects as are borne with a cross, &c.

CANTONING, in military affairs, implies the allotting distinct and separate quarters to each regiment of an army.

CANTRED, an old British word, signifying a hundred villages, and into which some of the Welsh counties are divided; being the same with what we call hundreds in England.

CANT-TIMBERS, in naval architecture, the most crooked timbers in a ship; they are situated at the two ends, and are called so, from their being canted, or raised obliquely from the keel, in contradistinction to those whose planes are perpendicular to it: the upper part of those in the bow or fore end of the ship, are inclined to the prow, as those in the after, or hind part, incline above the stern-post.

The principal of those last is the fashion piece, which terminates the stern.

CANVAS, in commerce, a very clear unbleached cloth of hemp, or flax, wove very regularly in little squares. It is used for working tapestry with the needle, by passing the threads of gold, silver, silk, or wool, through the intervals or squares.

CANVAS, also implies a very coarse cloth, made of unbleached hemp, used principally for making sails for shipping.

CANZONE, in musick, implies a particular species of song, where some little figures are introduced.

CANZONETTA, a diminutive of canzone, and the same thing, except that the songs are shorter.

CAP, a well known part of dress for covering the head.

CAP of Maintenance, one of the regalia, or ornaments of state belonging to the kings of England.

CAP of a Gun, a piece of lead which is put over the touch-hole of a gun, to keep the priming from being wasted or spoiled.

CAPS, in naval affairs, strong thick pieces of oak, of an oblong figure, with two holes in them, so fitted that the headmost or aftmost hole is bolted close down on the lower mast-head, and the foremost is for keeping the top-mast steady, which slides up and down through it; and so of the top-gallant mast.

CAPACITY, in geometry implies the solid content of any body, or the quantity of liquid any vessel will hold; and hence our hollow measures for beer, ale, wine, corn, &c. are called measures of capacity.

CAPACITY, in law, signifies ability, or power. Hence any person or incorporated body, are said to have the capacity of holding lands, suing out actions, and the like.

CAPARISON, in the menage, a horse-cloth, or cover thrown over the saddle, &c.

CAPE, in geography, a head-land, or promontory, shooting itself out into the sea.

CAPE, in law, implies a judicial writ respecting lands or tenements.

CAPELLETS, in horses, are particular swellings which those animals are subject to, of a wenny nature, which grow on the heel of the hock, and on the point of the elbow: they arise from bruises and other accidents, and when this is the case, should be treated with vinegar and other repellers; but when they grow gradually on both heels or elbows, we may then suspect the blood and juices to be in fault; that some of the vessels are broke, and the juices extravasated. In this case the suppuration should be promoted, by rubbing the part with marshmallow ointment; and when matter is formed, the skin should be opened with a lancet, in some dependent part towards one side, to avoid a scar: the dressings may be turpentine, honey, and tincture of myrrh. The relaxed skin may be bathed with equal parts of spirit of wine and vinegar; to which an eighth part of oil of vitriol may be added. The contents of these tumours are various, sometimes watery, at others suety, or like thick paste; which if care be not taken to digest out properly with the bag, will frequently collect again: was it not for the disfigurement, the shortest method would be to extirpate them with a knife, which,

if artfully executed, and the skin properly preserved, would leave very little deformity.

When those tumours proceed from an indisposition of the blood, they are best let alone, especially those of the watery kind, which will often wear off insensibly, without any applications; but when they are like to prove tedious, you should endeavour to disperse them by bathing the parts with repellers, and have recourse to rowels, purges, and diuretick medicines, to carry off the superfluous juices, and correct the blood. *Bartlett's Farriery, page 277.*

CAPELLA, in astronomy, a bright star of the first magnitude in the left shoulder of Auriga.

CAPER, *Capparis*, in botany, a genus of plants, the corolla of which consists of four roundish, emarginated, open petal: the fruit is a carnosé, turbinated capsule, with only one cell, containing numerous kidney-shaped seeds.

The buds of this plant make a considerable article in commerce; they are imported from Italy and France in pickle, and used in sauce, &c.

The caper-bark of the shops is not the bark of the branches, but that of the roots of the shrub which produces it.

It is an aperient and attenuant, and is recommended in nephritick cases, and in dropies, jaundices, and many other chronick diseases: but the present practice does not pay any regard to it.

CAPHAR, a duty which the Turks raise on all merchants, who carry goods from Aleppo to Jerusalem, and other places in Palestine and Syria.

CAP-AGA, the principal officer of the seraglio of the grand Signior.

CAPIAS, in law, signifies a writ or process, and is of two kinds; one before judgment, called Capias ad respondendum, granted on an action personal, when the sheriff, upon the first writ of distress, returns nihil habet in balliva nostra. The other is a writ of execution after judgment: which is of the several kinds following.

CAPIAS *conductos ad proficiscendum*, is a writ which lies against a soldier, who, having listed to serve the king in the war, and afterwards deserts, or does not appear at the time and place appointed. This is an original writ, directed to two serjeants at arms, to arrest and take him wherever he may be found, with a clause of assistance.

CAPIAS *pro fine*, is where a person being by judgment fined to the king, upon some offence committed against a statute, does not pay it according to the judgment, for by this writ his body is to be taken and committed to prison till he shall discharge the fine.

CAPIAS *ad satisfaciendum*, is a writ of execution after judgment, lying where a person recovers in an action personal, as debts, damages &c. in which case this writ is issued to the sheriff, commanding him to take the body of the person against whom the debt is recovered, and commit him to prison till he makes satisfaction.

CAPIAS *ut legatum*, is a writ of execution lying against a person outlawed upon any action, personal or criminal; by which the sheriff is directed to apprehend him for not appearing on the exigent, and keep him in custody till the return of the writ; when he is to represent him to the court, to be there further ordered for his contempt.

CAPIGI, certain inferior officers in the grand Signior's seraglio.

CAPILLAMENT, in a general sense implies a hair, and hence it has been used to signify many things which resemble hairs.

CAPILLAMENTS, in botany, the same with stamina. See the article STAMINA.

CAPILLARY, an epithet applied to several things on account of their fineness resembling a hair.

CAPILLARY PLANTS, in botany, are such as have no stem, their leaves arising immediately from the root, and produce their seeds on the backs of the leaves, as hart's-tongue, maiden-hair, &c.

CAPILLARY TUBES, in physicks, little pipes whose canals are extremely narrow, their diameter being only a half, third, or fourth of a line. See TUBE.



The ascent of water, &c. in capillary tubes, is a phenomenon that has long embarrassed the philosophers; for let one end of a glass tube, open at both ends, be immersed in water, and the liquor within the tube will rise to some sensible height above the external surface: or if two or more tubes are immersed in the same fluid, one of them a capillary one, the other of a larger bore, the fluid will ascend higher in the capillary tube than in the other, and this in the reciprocal ratio of the diameters of the tubes.

In order to account for this phenomenon, it will be necessary to premise, that there is a greater attraction between the particles of glass and water, than there is between the particles of water themselves: this appears plain from experience, which proves the attractive power in the surface of glass to be very strong; whence it is easy to conceive how sensibly such a power must act on the surface of a fluid, not viscid, as water, contained within the small cavity or bore of a glass tube; as also that it will be in proportion stronger as the diameter of the bore is smaller; for that the efficacy of the power follows the inverse proportion of the diameter, is evident from hence, that only such particles as are in contact with the fluid, and these immediately above the surface, can affect it.

Now these particles form a periphery contiguous to the surface, the upper part of which attracts and raises the surface, and the lower part, which is in contact with it, supports and holds it up, so that neither the thickness nor length of the tube avails any thing, only the said periphery of particles, which is always proportional to the diameter of the bore: the quantity of the fluid raised, will therefore be as the surface of the bore which it fills, that is, as the diameter; as the effect would not be otherwise proportional to the cause, since the quantities follow the ratio of the diameters, the heights to which the fluids will rise, in different tubes, will be inversely as the diameters.

**CAPILLARY Vessels**, in anatomy, are the smallest or extreme parts of the veins and arteries.

**CAPILITIUM Veneris**, in philosophy, the fine threads often seen floating in the air during the autumn.

**CAPISTRUM**, in surgery, the name of a bondage used in case of fractures of the jaw.

**CAPITAL**, in a general sense, implies the head, chief, or principal of a thing.

**CAPITAL**, in geography, the principal city of a kingdom, province, or state.

**CAPITAL**, among merchants, the sum of money which individuals advance to make up the common stock of a partnership when it is first formed. It is also used to signify the stock with which a merchant first begins trade. It likewise denotes the fund or stock of a trading company or corporation.

**CAPITAL Crime**, a crime which subjects the criminal to a capital punishment, or loss of life.

**CAPITAL**, in architecture, the uppermost part of a column or pilaster, serving as the head or crowning, placed immediately over the shaft, and under the entablature. See the article **ABACUS**.

*The Tuscan CAPITAL*; is the most simple and unadorned of all the rest; its members or parts are four only, viz. an abacus; an ovolo or quarter round; a collarino or neck; and an astragal; the latter indeed properly belongs to the fust or shaft.

The character which distinguishes this capital from the Dorick, &c. is that the abacus is square and quite plain, having no ogee or other moulding; and that there are no annulets under the ovolo. Authors indeed vary a little with regard to the character of the Tuscan capital. See **TUSCAN Order**.

*The Dorick CAPITAL* has three annulets, or little square members, underneath the ovolo, instead of the astragal in the Tuscan, besides the abacus, an ovolo and a neck, all which it has in common with the former; and a talon, cyma, or ogee, with a fillet over the abacus. See **DORICK Order**.

*The Ionick CAPITAL* is composed of three parts; an abacus, consisting of an ogee, under this a rind, which produces the volutes or scrolls, the most essential parts of this capital; and at the bottom an ovolo or quarter

round. The astragal under the ovolo belongs to the shaft; the middle part is called the rind or bark, from its supposed resemblance to the bark of a tree, laid on a vase, whose brim is represented by the ovolo, and seeming to have been shrunk up in drying, and to have been twisted into the volutes. The ovolo is adorned with eggs, as they are sometimes called from their oval form. See **IONIC Order**.

*The Corinthian CAPITAL* is the richest of all the orders, and imputed to Calimachus, an Athenian statuary, as we have already observed. It is adorned with eight volutes, a double row of leaves, and eight scrolls, situated round a body called by some campana or bell, and by others tambour or drum.

*The Composite CAPITAL*, is an invention of the Romans, and is composed of the double row of leaves in the Corinthian, and the volutes in the Ionick. See **COMPOSITE Order**.

*Attick CAPITAL*, that which has leaves of partition in the gorge.

*Angular CAPITAL*, that which supports the return of an entablature, at the corner of the projecture of a frontispiece.

*CAPITAL of a Balluster*, that part which crowns a balluster, resembling sometimes the capital of some order, generally the Ionick.

*CAPITAL of a Triglyph*, the plat-band over the triglyph, called by Vitruvius *tania*. It is sometimes a triglyph, and performs the office of a capital to the Dorick pilaster.

*CAPITAL of a Nich*, a kind of small canopy made over a shallow nich, to cover a statue.

*CAPITAL of a Lantern*, a covering, sometimes of one form, and sometimes of another, which finishes the lantern of a dome.

*CAPITAL of a Bastion*, a line drawn from the point of the bastion to the angle of the polygon; or from the point of the bastion to the middle of the gorge.

**CAPITALS** among printers, large or initial letters, with which all periods, verses, &c. commence.

**CAPITATION**, a tax raised on each person in consideration of his labour, industry, office, rank, &c.

**CAPITOL**, in antiquity, a celebrated castle erected on the summit of the Mons Capitolinus at Rome, and contained a temple dedicated to Jupiter, in which the senate formerly assembled.

**CAPITULATION**, in military affairs, implies the conditions on which the garrison of a place besieged, agrees to deliver it up.

**CAPITULATION**, in the German polity, implies a contract made by the emperor with the electors, in the name of all the princes and states of the empire, before he is declared emperor, and which he ratifies before he is raised to the imperial dignity.

**CAPITULUM**, or umbel, in botany. See the article **UMBELLÆ**.

**CAPONIERE**, in fortification, a covered lodgment on the glacis, about four or five feet broad, encompassed with a small parapet of about two feet high, which supports several planks loaded with earth.

**CAPRA**, or **GOAT**, a genus of quadrupeds belonging to the order of pecora. The horns are hollow, turned upwards, erect, and scabrous. There are eight fore-teeth in the under jaw, and none in the upper; and they have no dog-teeth. This genus consists of twelve species, viz.

1. The hircus, or common goat, with arched carinated horns, and a long beard. The goat of Angora is only a variety of this species; its hair is white, and hangs down to the feet; and the ears are plain and pendant. The common goat is a native of the eastern mountains.

The goat is an animal of more sagacity than the sheep. Instead of having an antipathy at mankind, they voluntarily mingle with them, and are easily tamed. Even in uninhabited countries, they betray no savage dispositions. In the year 1698, an English vessel having put in to the island of Bonavista, two negroes came aboard, and offered gratis to the captain as many goats as he pleased. The captain expressed his astonishment at this offer. But the negroes replied, that



that there were only twelve persons in the island; that the goats had multiplied to such a degree, that they were become extremely troublesome; and that, instead of having any difficulty in catching of them, they followed the men wherever they went, and were so obstinately officious, that they could not get quit of them upon any account whatever.

Goats are sensible of caresses, and capable of a considerable degree of friendship. They are stronger, more agile, and less timid than sheep. They have a lively, capricious, and wandering disposition; are fond of high and solitary places; and frequently sleep upon the very points of rocks. They are more easily supported than any other animal of the same size; for there is hardly an herb or the bark of a tree, which they will not eat with pleasure. Neither are they liable to so many diseases as sheep: They can bear heat and cold with less inconvenience. The actions and movements of animals depend more upon the force and variety of their sensations, than the structure of their bodies: The natural inconstancy or fancifulness of goats is accordingly expressed by the irregularity of their actions: They walk, stop short, run, jump, shew, and hide themselves, as it were by mere caprice, and without any other cause than what arises from the natural vivacity of their temper.

The buck will copulate when he is a year old, and the female when she is seven months. But as this is rather premature, they are generally restrained till they be eighteen months or two years. The buck is bald, beautiful, and vigorous; one is sufficient to serve 150 females. A buck for propagation should be large, handsome, and about two years of age; his neck should be short, and fleshy; his head slender; his ears pendent; his thighs thick; his limbs firm; his hair black, thick, and soft; and his beard should be long and bushy. The females are generally in season from September to the end of November. The time of going with young is five months. They generally produce one kid, sometimes two, seldom three, and never more than four; and continue fruitful till they be seven years of age: But a buck is seldom kept after he is five.

Goat's flesh is not so good as mutton: The rank smell of the buck does not proceed from the flesh, but from the skin.

The food of this animal costs next to nothing, as it lives mostly upon such plants as are rejected by other cattle, and can support itself even upon the most barren mountains. But their produce is valuable. Cheese is made of their milk, which besides is reckoned good in consumptions, and other diseases. Their flesh, tallow, hair, and hides, are all useful and saleable commodities.

2. The ibex, has large knotty horns reclined upon its back, is of a yellowish colour, and its beard is black. This species is a native of Crete; and is likewise to be met with in the mountains of some of the northern parts of Europe.

3. The mambrica, with reclined horns, about the length of the neck, pendent ears, and a beard. It is a native of India.

4. The rupicapra, or shamoy-goat, has erect and hooked horns. It inhabits the inaccessible mountains of Switzerland. The body is of a dusky red colour; but the front, top of the head, gullet, and inside of the ears are white; the under part of the tail is blackish; and the upper lip is a little divided. They seldom descend from the mountains but in hard winters, when they come down to feed upon the branches and barks of fir-trees, &c. On occasions of this kind, one of the herd always keeps watch to give notice to the rest of any approaching danger.

5. The depressa, is an American goat, with small depressed horns, bent inwards and laying upon the head. It is about the size of a kid; and the hair is long and pendulous.

6. The reverfa, is likewise an American goat, with erect horns curved back at the points. It is about the size of a kid of a year old.

7. The gazella, is an Indian goat, with long, erect, cylindrical horns, annulated near the base.

8. The cervicapra, is likewise an Indian goat, with plaited, cylindrical horns. The hair near the horns is longer than in any other part of the body.

9. The Bezoartica, or Bezoar-goat, is bearded, and has cylindrical, arched, and wholly annulated horns. It is a native of Persia. The bezoar is found in one of the stomachs called *abomasus*.

10. The dorcas, or antelope, has cylindrical, annulated horns, bent backward, contorted, and arising from the front between the eyes. It is a native of Africa and Mexico.

11. The Tartarica, has cylindrical, strait, annulated horns, diaphanous at the points. It has no beard, and is found in the northern parts of Asia.

12. The ammon, has semicircular, plain, white horns, and no beard. It is about the size of a ram, and is a native of Siberia.

CAPRARIA, in botany, a genus of the didynamia angiospermia class. The calix is divided into five segments; the corolla is bell shaped, and divided into five parts; the capsule has two valves, and contains many seeds. There are three species, none of them natives of Britain.

CAPRICORNUS, or CAPRICORN, in astronomy, one of the twelve signs of the zodiack, represented on the globe in the form of a goat, with a fish's tail. It is the tenth sign in order, (See *Plate IV. fig. 10*) and is marked thus ♈ in books. According to Ptolemy and Tycho, it contains 19 stars, according to Hevelius 29, and according to Flamsteed 51.

This constellation is very properly represented by the wild goat, whose nature being to seek its food from the bottom to the top of mountains, climbing from rock to rock, fitly emblemized the ascent of the sun, from the lowest point, in the beginning of this sign, to its highest pitch or summit, in the summer solstice.

*Tropic of CAPRICORN*, a lesser circle of the sphere, which is parallel to the equinoctial, and at 23° 30' distance from it southwards.

CAPRIFICATION, a method used in the Levant, for ripening the fruit of the domestick fig-tree, by means of insects bred in that of the wild fig-tree.

It is said, that these figs will never come to maturity, unless wounded by the insects depositing their eggs. Possibly the reason of this effect, may be their lacerating the vessels of the fruit, and thereby deriving thither a greater quantity of nutritious juice.

Plumbs and pears, wounded in the same manner, are found to ripen soonest, and the pulp about the wound has a more exquisite taste than the rest.

CAPRIFOLIUM, in botany. See *LONICERA*.

CAPRIMULGUS, GOAT-SUCKER, or FERNOW-L, in ornithology, a genus of birds belonging to the order of passerres. The beak is incurvated, small, tapering, and depressed at the base; the hairs at the mouth, which it opens very wide, are placed in a row. It is a native of Europe, and feeds upon moths and nocturnal insects. This bird is said to suck goats in the night.

CAPRIOLES, in the menage, leaps that a horse makes in the same place, without advancing, in such a manner, that when he is at the height of the leap, he jerks out with his hinder legs even and near. It is the most difficult of all the high menage. It differs from a croupade in this, that in a croupade the horse does not shew his shoes; and from a ballotade, because in this he does not jerk out. To make a horse work well at caprioles, he must be put between two pillars, and taught to raise first his fore-quarters, and then his hind-quarters, while his fore are yet in the air, for which end you must give the whip and the poinçon.

CAPSICUM, or GUINEA-PEPPER, a genus of the pentandria monogynia class. The corolla is rotated, and the berry wants juice. There are two species, both natives of the Indies. The seeds are used in sauces and pickles.

CAPSQUARES, in gunnery, strong plates of iron which come over the trunnions of a gun, and keep it in the carriage.

They are fastened by a hinge to the prize-plate, that they may lift up and down, and form a part of an arch in the middle to receive a third part of the thick-



thickness of the trunnions; for two thirds are let into the carriage, and the other end is fastened by two iron wedges, called the fore-locks and keys.

**CAPSTON**, or **CAPSTERN**, in naval architecture, signifies a strong, massy piece of timber in the form of a truncated cone, and having its upper part, called the drum-head, pierced with a number of square holes, for receiving the bars or levers. It is let down perpendicularly through the decks of a ship, and fixed in such a manner, that the men by turning it round with their bars may perform several actions that require extraordinary power; as heaving up the anchors, &c.

**CAPSULATE**, or **CAPSULATED PLANTS**, those whose seed are contained in capsules.

**CAPSULE**, among botanists, implies a hollow pericarpium or seed-vessel, which cleaves or parts in some determinate manner: it is composed of several elastick valves, which, at the proper season, burst open and discharge the seed; it is distinguished from a pod by being short and of a roundish figure.

**CAPSULE**, in anatomy, signifies a covering for the receptacle of some fluid.

**CAPTAIN**, a military officer, who has the command of a certain number of men, a ship of war, or the like.

**CAPTION**, a certificate signed by the commissioners who have executed any particular commission, declaring when and where the commission was executed.

**CAPTIVE**, a prisoner taken in war, or by some private corsair, &c.

**CAPTURE**, a prize taken in time of war.

**CAPUT**, the head, in anatomy. See **HEAD**.

**CAPUT MORTUUM**, in chymistry, implies the dry earthy matter left after the distillation of acid spirits, &c.

**CARABINE**, a fire-arm, shorter than a musket, carrying a ball of twenty-four in the pound, borne by the light-horse, hanging at a belt over the left shoulder.

The barrel is two feet and a half long, and is sometimes furrowed spirally within, which is said to add to the range of the piece.

**CARABINEERS**, or **CARABINIERS**, regiments of light horse, carrying longer carabines than the rest, and used sometimes on foot.

**CARACOL**, in the menage, the half turn which a horse-man makes, either to the right or left.

In the army, the horse always make a caracol after each discharge, in order to pass to the rear of the squadron.

**CARACOL**, in architecture, denotes a stair-case in a helix or spiral form.

**CARACT**, or **CARAT**, the name of a weight expressing the degree of the fineness of gold: it is the 24th part of any quantity or weight. It is divided into 4 parts, called grains of a carat, and each of these is subdivided into halves and quarters.

If an ounce, or any other weight, of gold be so pure, that on its being fluxed with antimony, &c. it loses nothing of its weight, it is said to be gold of 24 carats; if it loses one twentieth part of its weight, it is said to be gold of 23 carats, &c.

**CARACT**, is also the name of a weight, used by jewellers for weighing precious stones; it weighs 4 grains.

**CARAITES**, a religious sect among the Jews, who reject the cabbala, and adhere closely to the text and letter of scripture.

**CARANNA**, a resinous substance brought from New Spain in little masses rolled up in leaves of flags. It is rarely kept in the shops, and is rejected by the catalogue of the London college, though it is still retained in the Edinburgh.

**CARAVAN**, or **CARAVANNE**, in the East, signifies a company or assembly of travellers and pilgrims, and more particularly of merchants, who, for their greater security, and in order to assist each other, march in a body through the deserts, and other dangerous places, which are infested with Arabs or robbers.

There is a chief, or aga, who commands the caravan, and is attended by a certain number of janizaries, or other militia, according to the countries from whence the caravans set out; which number of soldiers must

be sufficient to defend them and conduct them with safety to the places for which they are designed, and on a day appointed. The caravan encamps every evening near such wells or brooks, as their guides are acquainted with; and there is a strict discipline observed upon this occasion, as in armies in time of war. Their beasts of burden are partly horses, but most commonly camels, who are capable of undergoing a very great fatigue.

**CARAVANSERA**, or **KARAVANSERA**, a place appointed for receiving and loading the caravans.

It is commonly a large square building, in the middle of which there is a very spacious court; and under the arches or piazzas that surround it there runs a bank, raised some feet above the ground, where the merchants, and those who travel with them in any capacity, take up their lodgings as well as they can; the beasts of burden being tied to the foot of the bank. Over the gates, that lead into the court, there are sometimes little rooms, which the keepers of the caravanseras let out at a very high price to such as have a mind to be private.

**CARAWAY**, in botany. See **CARUM**.

**CARBUNCLE**, in natural history, a very elegant gem, whose colour is deep red, with an admixture of scarlet.

This gem was known among the ancients by the name of anthrax. It is usually found pure and faultless, and is of the same degree of hardness with the sapphire: it is naturally of an angular figure, and is found adhering, by its base, to a heavy and ferruginous stone of the emery kind: its usual size is near a quarter of an inch in length, and two thirds of that in diameter in its thickest parts: when held up against the sun, it loses its deep tinge, and becomes exactly of the colour of a burning charcoal, whence the propriety of the name which the ancients gave it. It bears the fire unaltered, not parting with its colour, nor becoming at all the paler by it. It is only found in the E. Indies, so far as is yet known, and there but very rarely.

**CARBUNCLE**, or **ANTHRAX**, in surgery, an inflammation which arises, in time of the plague, with a vesicle or blister almost like those produced by burning. See **BUBO**.

**CARBUNCLE**, in heraldry, a charge or bearing, consisting of eight radii, four whereof make a common cross, and the other four a saltier.

Some call these radii buttons, or slaves, because round, and enriched with buttons, or pearled like pilgrims slaves, and frequently tipped or terminated with flower-de-luces; others blazon them, royal sceptres, placed in saltier, pale and fesse.

**CARBUNCULATION**, a term used by some gardeners, to imply the blasting of trees, either, with excess of heat, or excess of cold.

**CARCASE**, in architecture, the shell of a house, containing the partitions, floors, rafters, &c.

**CARCASSE**, or **CARCASS**, among engineers, implies a hollow case of iron about the size of a bomb, having two or three apertures through which the fire is to blaze, and filled with various materials proper for firing houses. These instruments of destruction are thrown from mortar-pieces into besieged places.

**CARCINOMA**, from *καρκιν*, a crab. See **CANCER**.

**CARD**, among artificers, an instrument consisting of a block of wood, beset with sharp teeth, serving to arrange the hairs of wool, flax, hemp, and the like: there are different kinds of them, as hand-cards, stock-cards, &c.

**CARD**, among gamesters implies a small piece of fine pasteboard, in the form of a parallelogram: cards are of various sizes, but those commonly used in England are about three inches and a half long, and two and a half broad.

**CARD-MAKING**, the art of making playing cards, or painting on the surface of the pasteboard, the various figures necessary for rendering them proper to answer the intended design.

The moulds from which the cards are printed are cut upon



upon wood or copper, and the impression taken off upon paper. The ink used for this purpose is composed of lampblack and thin glue. A number of the court cards are cut on each mould, and the paper is wet in the same manner as in common printing, before the impression is taken off. When the papers are printed, they are thoroughly dried, and then pasted on other papers, by which means the whole forms a thin pasteboard. The common black and red cards are wholly finished in this manner, the former being printed with black and the latter with red ink, composed of vermilion and size. But the court cards are painted by means of patterns called stanfiles. These consist of papers cut through by a penknife, and in these apertures, they apply severally the various colours, as red, blue, yellow, &c. These patterns are painted with oil colours that the brushes may not wear them out; and each pattern is of the same size with that of the block or mould from whence the cards are printed. When this operation is over, and the colour well dried, they are pressed very hard, in order to render the pasteboard smooth: after which they are brushed over with fine size, and when dry well polished. The next operation is to cut them into separate pieces, after which they are made up into packs, and being stamped at the office, are ready for sale.

**CARDAMINE**, *LADY'S SMOCK*, in botany, a genus of the tetradynamia filiquosa class. The pod opens with a spring, and the valves are revolved: the stigma is entire; and the calix gapes a little. There are fifteen species, seven of which are natives of Britain, viz. the bellidifolia, or daisy-leaved lady's-smock; the petræa, or mountain lady's-smock; the pratensis, or common lady's-smock; the amara, bitter cresses, or lady's-smock; the impatiens, or impatient lady's-smock; the parviflora, or small flowered lady's-smock; and the hirsuta, or hairy lady's-smock. The common sort grows naturally in the meadows in many parts of England, which being eaten by way of salad in the spring, is supposed to be a good antiscorbutick.

**CARDAMOM**, in materia medica, the seeds of a species of amomum. They are distinguished into the lesser and greater. The greater cardamom is a dried fruit or pod containing two rows of small triangular seeds of a warm aromatick flavour. The lesser is about half the size of the former, and the seeds are considerably stronger both in smell and taste. Hence this sort is the only one now used as a medicine. The seeds are warm, grateful, pungent, aromatick, and frequently employed as such in practice.

**CARDIACA**, mother-wort, a distinct genus of plants, with square branched stalks, the leaves set in pairs on long pedicles at the joints, and the flowers in clusters round the upper joints: the leaf is dark coloured, cut deeply into three sharp-pointed, indented segments, of which the middle one is the longest, and the two lateral ones commonly more deeply cut: the flower is purplish, labiated, with the upper lip long and arched, the lower short and cut into three sections. It is perennial, grows wild in waste grounds, and flowers from the middle to the end of summer.

It is said to cure convulsions, open obstructions of the viscera, and to kill worms, and some account it excellent in diseases of the spleen, and the hysterick passion; the leaves and tops have a moderately strong smell not very agreeable, and a very bitter taste. The dose of the leaves in powder is a dram, and must be taken in wine.

**CARDIACK**, in pharmacy, an appellation given to those medicines which have an immediate effect upon the spirits, or which contribute to accelerate and quicken the motion of the solids; so that the sensations at the head, stomach, and heart, become more lightsome and agreeable than before.

**CARDIACUS PLEXUS**, in anatomy, a plexus or piece of net-work, formed of a ramification of the par vagum, or eight pair of nerves.

**CARDIALGIA**, the **HEART-BURN**, in medicine, a disorder of the stomach attended with anxiety, a nausea, and often a reaching or actual vomiting.

The causes of this disorder, are either vitiated hu-

mours in the stomach, which occasion a nausea and vomiting, or in the common heart-burns, wind, indigestion, and now and then worms. But more frequently a cardialgia proceeds from congestions of blood about the stomach, which happen to those who are full of blood, but more especially to hypochondriack and hysterick persons.

The cure of a common heart-burn from indigestion, and the acrimony of the contents of the stomach, may be performed by drinking tea, or a decoction of camomile-flowers; as also by taking bitters, or the testaceous and absorbent powers. When it arises from a crapula, gentle emeticks will be useful; and if it proceeds from a congestion of blood, bleeding will be convenient, after which antispasmodicks are to be given.

If it is occasioned by acute stomachick fevers, rhubarb or ipecacuanha, in a moderate dose, may be prescribed; and if by worms, it must be treated with medicines proper for killing worms.

**CARDINAL**, an epithet applied to many things, on account of their pre-eminence. As the cardinal virtues, are justice, prudence, temperance, and fortitude: the cardinal winds are those which blow from the east, west, north, and south points of the horizon; and these are also called the cardinal points of the horizon or compass.

**CARDINAL**, is also used as a substantive, to imply an ecclesiastical prince in the Romish church, and one of the pope's council or senate.

**CARDING**, among manufactures, signifies the operation of combing, disentangling the wool with instruments called cards, in order to render it proper for the work for which it is designed.

The operation of carding is not however confined to wool; cotton, flax, hair, and other materials used in several kinds of manufactures, are also carded.

**CARDIOID**, in the higher geometry, an algebraical curve resembling a heart.

**CARDIOSPERMUM**, in botany, a genus of the octandria trigynia class. The calix has four leaves; there are four petals; an unequal four-leaved nectarium; and there are three inflated capsules. There are two species, both natives of the Indies.

**CARDO**, in anatomy, a name given to the second vertebra of the neck.

**CARDUUS**, the thistle, in botany, a genus of plants ranged by Linnæus, among the syngenesia-polygamia-æqualis; the compound flower of which is tubulous and uniform, the proper flower is monopetalous, of a funnel form, with a very small tube and erect limb, divided into five equal segments. There is no pericarpium, but the cup is a little convivent, and contains several seeds crowned with a very long down.

**CARDUUS Benedictus**, in the materia medica, a species of the carduus growing naturally in Spain, and some of the islands of the Archipelago, and sown annually with us in gardens. The infusion of it is sometimes used for working off an emetick.

**CARDUUS FULLONUM**, a name by which the dipsacus, or teazel, is sometimes called. See the article **DIPSACUS**.

**CAREENING**, in the sea language, the bringing a ship to lie down on one side, in order to trim and caulk the other side. A ship is said to be brought to the careen, when the most of her lading being taken out, she is hauled down on one side by a small vessel as low as necessary, and there kept by the weight of the ballast, ordnance, &c. as well as by ropes, lest her masts and bottom may be trimmed, seams caulked, or any thing that is faulty under water, mended. Hence when a ship lies on one side when she sails, she is said to sail on the careen.

**CAREER**, in the menage, signifies the ground that is proper for the menage, and the course or race of a horse that does not go beyond two hundred paces.

In the ancient circus, the career was the space the chariots were to run at full speed to carry the prize.

**CARET**, among grammarians, implies a character marked thus ^ placed in the line, to signify that some word,



word, sentence or letter omitted, ought to have come in where the caeset is placed.

**CARGO**, in naval affairs, the merchant-goods of whatever sort with which a ship is freighted, and proceeds from port to port.

**CARIA**, in zoology, a species of ant, common in the East-Indies, and larger than those with us.

They are very mischievous, living in large communities, and throwing up hills of earth five or six feet high.

**CARICATURA**, in painting, an Italian word, principally applied to grotesque figures, which retain an extravagant and ugly, but real resemblance of the person they are designed to represent, and lash whomsoever the painter, carver, or graver, has a mind to satyrize, or divert himself with. Calot excelled in the caricatura. But burlesque in painting, like burlesque in poetry, should be confined within due bounds.

**CARIES**, in surgery, the corruption of a bone occasioned by its being deprived of its periosteum, or a depravation of the juices.

We find two causes of the caries of a bone, one arising from a wound, or any other accident, when the bone is exposed to the injuries of the external air, or is corrupted by unskilfulness in dressing; the other, when the fluids are interrupted in their circulation, by any external violence, or internal cause whatsoever, from whence inflammation and suppuration succeed; by which the periosteum and bone losing their nourishment, on account of the vessels being enflamed and corrupted, quickly becomes carious; or from venereal causes. Hence it appears that there are several degrees of a caries of the bone, but the worst kind is that which falls upon the joints, or any parts of the bone that lie deep, because as there is no access to clean it, the case admits of no remedy but amputation of the limb. With regard to the cure of a caries, the mildest method is applied to the slightest degree, and is performed by the application of spirituous remedies, or by balsamicks. In a caries that penetrates somewhat deeper, stronger remedies take place, such as the pulvis euphorbii cum spiritu vini optimo parato, aqua phagedænica, or a solution of mercury in aqua fortis, or spirit of nitre; and when by these you have procured an exfoliation of the diseased part, the cure is to be completed with balsamicks. A second method consists in perforating the bone, after it is laid bare with an instrument; after which it is to be dressed with dry lint, or balsamick medicines. A third method is performed by scraping away the vitiated part of the bone with a raspatory, or chissel, till all the corrupted parts being destroyed, the bone appears white or ruddy, and sound. The fourth, which is the most ancient and most certain method of cure, especially in the greater degrees of this disorder, is performed by burning down the vitiated part of the bone with the actual cautery; and in this operation great care must be taken not to injure the flesh, or other soft parts that lie near it. In fine, the principal business in curing a caries of the bone consists in a speedy extirpation of the carious parts of the bone, and the rest of the cure is performed in the same manner.

**CARLINA**, the Carline thistle, in botany, a genus of plants ranged by Linnæus among the singynesia polygamia-æqualis, and of which there are a great variety of species. The compound flower is uniform and tubulose; the particular flower consists of a single funnel-shaped petal, with a small tube; the limb being campanulated, and divided into five segments: it has no pericarpium, the seeds are single, and roundish.

**CARLINGS**, in ship-building, short pieces of timber ranging fore and aft, from one of the deck beams to another, into which their ends are scored: they are useful to sustain and strengthen the smaller beams of the ship.

**CARMELITES**, or **WHITE FRIARS**, an order of our Lady of mount Carmel, and pretend to derive their origin from the prophets Elijah and Elisha.

**CARMINATIVES**, in pharmacy, are medicines appropriated to expel wind.

A great many seem to be strangers to this term; as it does not appear to carry in it any thing expressive of

the medicinal efficacy of those simples which pass under its denomination. This term had certainly its rise, when medicine was too much in the hands of those jugglers, who for want of true knowledge in their profession, brought religion into their party; and what through their ignorance they were not able to do by rational prescription, they pretended to effect by invocation and their interest with heaven: which cant being generally, for the surprize sake, couched in some short verses; the word *carmen*, which signifies a verse, was used also to mean an enchantment; which was frequently made use of to satisfy the people of the operation of a medicine they could not account for. And as those medicines now under this name, are of quick efficacy, and the consequences thereof, in many instances, surprising; and the most violent pains, sometimes arising from pent-up wind, immediately ceasing upon its dispersion; such medicines as give relief, in this case, are more properly termed carminatives, as if they cured by enchantment.

How they expel wind may be conceived, when we consider that all the parts of the body are perspirable. Sanctorius, in his *Medicina Statica*, determines all we call wind in the bowels to be such perspirable matter as makes its escape through the coats of the stomach and intestines. Between the several membranes likewise of the muscular parts may such matter break out, and lodge for some time. Now whatsoever will rarify and render such collections of vapour thinner, must conduce to their utter discharge out of the body; and consequently remove those uneasinesses which arise from their detention. And as all those things that pass under this denomination are warm, and consist of very light subtil parts, it is easy to conceive how a mixture of such particles may agitate and rarify those flatulencies, so as to facilitate their expulsion; especially considering those grateful sensations which such medicines give to the fibres, which cannot but invigorate their tonick undulations so much, that by degrees the obstructed wind is dislodged, and at last quite expelled: but if the obstruction be not great, the rarification of the wind, upon taking such a medicine, is often so sudden, and likewise its discharge, that it goes off like the explosion of gunpowder.

All the things under this class being warm and diffusible, are much used in the composition of catharticks, of the rougher sort especially: for the irritation occasioned by those would be scarce tolerable without the mitigation of such grateful ingredients. Many likewise of this sortment are in the composition of discutive topicks.

**CARMINE**, a very beautiful red colour, extracted from cochineal by means of water impregnated with alkaline salts, and precipitated with tin dissolved in aqua regia.

**CARNATION**, in botany, a beautiful tribe of flowers, considered by Linnæus as a species of the dianthus, which comprehends the clove-july-flower and the pink, which we consider as different flowers.

These flowers are either single or double, but the latter only are regarded by florists, nor even these except they have particular appearances to recommend them.

The principal properties in a good carnation are as follow: 1. The stem of the flower should be strong and able to support the weight of the flower, without lopping down. 2. The petals (or leaves) of the flower should be large, broad, stiff, laying flat, without any indentures on their edges: arising from the extremity to the centre regularly, so as to form the whole as nearly hemispherical as possible. 3. The pod should be cylindrical, neither too short nor too long, for if it is too short the extreme petals will fall down and much diminish the beauty of the flower, and if too long, the flower will be contracted, which is disagreeable to a curious eye: it is also esteemed a good property if the flower expands without the pod bursting, which it is very apt to do. 4. The colours should be bright, equally striped, on a pure white ground, for if there is one petal single coloured, it is called run, (in the florists language) and despised.



*Spanish* CARNATION, a name sometimes used for the poinciana of botanists.

CARNATION Colour, among painters, is understood of all the parts of a picture, in general, which represent flesh, or which are naked and without drapery.

In colouring for flesh, there is great a variety, that it is hard to lay down any general rules for instruction therein; neither are there any regarded by those who have acquired a skill this way: the various colouring for carnations, may be easily produced, by taking more or less red, blue, yellow, or bistre, whether for the first colouring, or for the finishing: the colour for women should be bluish; for children a little red, both fresh and gay; and for men it should incline to yellow, especially if they are old.

CARNELIAN, or CORNELIAN, *Sarda*, in natural history, a precious stone, of which there are three sorts, distinguished by the three colours, red, yellow, and white. It is principally used for engraving of seals.

CARNEY, in farriery, a disease in horses, when their mouths become so much furrowed, that they cannot eat.

CARNIVAL, or CARNAVAL, a time of rejoicing, observed with great solemnity by the Italians, particularly at Venice.

CARNIVOROUS, an epithet applied to animals who feed on flesh.

CARNIUS, among the ancient chronologists, was one of the months of the civil year,

CARNOSE, or CARNOUS, something belonging to, or abounding with flesh.

CARNOSITY, among surgeons, implies an excrescence or tubercle in the urethra.

CAROB-TREE, *ceratonia*, in botany. See the article CERATONIA.

CAROLINE-Books, the name of four books, composed by order of Charlemagne, to refute the second council of Nice. These books are couched in very harsh and severe terms, containing one hundred and twenty heads of accusation against the council of Nice, and condemning the worship of images.

CAROLUS, a broad piece of gold, struck in the reign of Charles I. worth about three and twenty-shillings.

CAROTIDS, in anatomy, two arteries of the neck, which convey the blood from the aorta to the brain. See the article ARTERY.

CARP, the name of a fresh-water fish, well known in England, and considered as the most valuable of all fish for stocking ponds.

CARPENTRY, the art of cutting, framing, and joining large pieces of wood, for the uses of building.

Carpentry is the most ancient of all kinds of architecture; its origin goes back as far as the beginning of the world. Men, at first, ignorant of what treasures the earth contained within her womb, and knowing nothing but her external productions, felled trees in the forests to build their first cottages; they afterwards erected nobler buildings of the same materials. Architecture stands indebted to carpentry for one of the prettiest embellishments of its orders, if it be true that fluted columns are done in imitation of the contraction of the trunks of trees as they grow upward. This metropolis even to this day furnishes remains of the ancient custom of building in wood, and shews our ancestors preferred it even to stone. One may add, in favour of this art, the almost universal custom of building in wood throughout all the northern countries.

CARPET, a sort of covering of stuff, or other materials, wrought with the needle or in a loom, forming part of the furniture of a house, and is commonly spread over tables, or laid upon the floor.

Persian and Turkey carpets are those most esteemed; though at Paris there is a manufactory after the manner of Persia, where they make them little inferior, not to say finer, than the true Persian carpets. They are velvety, and perfectly imitate the carpets which come from the Levant. There are also carpets of Germany, some of which are made of woollen stuffs, as serges, &c. and called square carpets: others are made of wool also, but wrought with the needle, and often embellished with

filk; and lastly, there are carpets made of dog's hair. We have likewise carpets made in England equal to any brought from the East.

CARPINUS, the horn-beam, in botany. See the article HORNBEAM.

CARPOBALSAM, in the materia medica, the fruit of the tree which yields the true balm or balsam of Gilead.

CARPOCRATIANS, in ecclesiastical history, a sect of hereticks, formed from a branch of the ancient Gnosticks. They appeared about the middle of the second century, and held the most abominable tenets.

CARR, among the ancients, a kind of throne mounted on wheels, and used in triumphs, and other solemn occasions.

CARRACK, the name given to the large ships used by the Portuguese, in the E. India, and Brazilian trade.

CARRAT. See the article CARACT.

CARRIAGE, a vehicle, generally mounted on wheels, and used in conveying persons, and goods, from one place to another.

CARRIAGE of a Cannon, a sort of a cart or dray composed of two long pieces of wood, called sides, or cheeks, which are made in a bending form, so that one end of them rests on the ground, and the other is supported by the axis or axle-tree of the wheels, from which it jets out about a foot. The cheeks are joined to each other by four pieces of wood, called cross-quarters or transums; the first is called the transum of the chace; the second the transum of the bed; the third the transum of the sight; and the fourth, which fills all the space between those parts of the cheeks that rest on the ground, is called the transum of the lunet, or eye-hole. In the cheeks, between the part that is opposite to the transum of the chace, and that which is opposite to the axle-tree of the wheels of the carriage, are two semicircular notches, in which the trunnions of the cannon are placed; on the three first transums, is placed a piece of wood of a proper thickness, on which the breech of the cannon rests; this plank is called the bed of the carriage.

When the cannon is to be carried into the field, or removed from one place to another, the limber (avaunt train) or fore-carriage, is added to that part of the cheeks where the transum of the lunet is placed.

Besides the carriage now described, which is the most common, and called the wheel-carriage, there are fort-carriages, sea-carriages, and bastard-carriages which have low solid wheels, that serve to move them on a rampart, or to and fro in other places of small extent.

CARRIAGE, in agriculture, a furrow for the conveyance of water to overflow and improve the ground. It is distinguished into two sorts: the main carriage, which should be made with a convenient descent; and the lesser carriages, which should be shallow, and as many in number as possible.

CARRIER, a person who makes it his business to carry goods for other persons, from one place to another, for hire.

CARROT, *Daucus*, in botany. See DAUCUS.

CAROUSAL, a magnificent entertainment, exhibited by princes on some publick occasion; consisting of a cavalcade of gentlemen richly dressed and equipped, after the manner of the ancient cavaliers divided into squadrons, meeting in some publick place, and performing jousts, tournaments, &c.

CART, a vehicle mounted on two wheels, and drawn by one or more horses.

CART-WRIGHT, a person whose business it is to make carts, waggons, &c.

CARTEL, an agreement made between two states for the exchange of their prisoners of war.

CARTESIANS, a sect of philosophers, who adhere to the system of Des Cartes, and founded on the two following principles; the one metaphysical, the other physical: the metaphysical one is, *I think, therefore I am*: the physical one is, *That nothing exists but substance*. Substance he makes of two kinds; the one a substance that thinks, the other a substance extended; whence actual thought and actual extension are the essence of substance.



The essence of matter being thus fixed in extension, the Cartesians conclude, that there is no vacuum, nor any possibility thereof in nature, but that the world is absolutely full: mere space is precluded by this principle, in regard, extension being implied in the idea of space, matter is so too.

Upon these principles, the Cartesians explain mechanically, and according to the laws of motion, how the world was formed, and whence the present appearances of nature do rise. They suppose, that matter was created of an indefinite extension, and divided into little square masses, full of angles; that the Creator impressed two motions on this matter; one whereby each part revolved round its centre, another whereby an assemblage, or system, turned round a common centre; whence arose as many different vortices as there were different masses of matter, thus moving round common centres.

The consequences of this hypothesis, according to the Cartesians, will be, that the parts of matter in each vortex could not revolve among each other, without having their angles gradually broken, and that this continual friction of parts and angles produced three elements; the first, an infinitely fine dust, formed of the angles broken off; the second, the spheres remaining, after all the angular irregularities are thus removed; these two make the matter of Des Cartes's first and second element; and those particles not yet rendered smooth and spherical, and which still retain some of their angles, make the third element.

Now, according to the laws of motion, the subtlest element must take up the centre of each system, being that which constitutes the sun, the fixed stars above, and the fire below; the second element, composed of spheres, makes the atmosphere, and all the matter between the earth and the fixed stars, in such a manner as that the largest spheres are always next the circumference of the vortex or system, and the smallest next its centre; the third element, or the hooked particles, is the matter that composes the earth, all terrestrial bodies, comets, spots in the sun, &c.

Such is the romantick system of Des Cartes. We call it romantick because it had no existence in nature; and was therefore demolished by observations.

**CARTHAMUS**, bastard saffron, in botany, a genus of plants whose flower is composed of several hermaphrodite florets, each of which are monopetalous and funnel-shaped; containing five short capillary filaments, topped with cylindrical and tubulose antheræ: it has no pericarpium; but the calyx incloses a single, oblong, angular seed.

There are several species of carthamus; but the common sort imported for use answers the following description. The plant is annual, and rises with a stiff ligneous stalk, about three feet high, dividing upwards into many branches. These are furnished with oval pointed leaves, which are entire, and joined close to the stalk, slightly serrated, and prickly about their edges. The flowers are produced at the extremity of each branch, of a saffron colour, and are succeeded by smooth white seeds.

This plant is a native of Egypt, and much cultivated in Germany, for the use of dying and painting. It is there sown in open fields in the spring, and hoed out in the manner we do turnips. The flowers are used by the dyers, and the seeds in medicine. These are accounted a pretty strong cathartick, bringing away ferous gross humours; and is reckoned very good in the dropsy and jaundice; but being a nauseous medicine, the present practice seldom prescribes it.

**CARTHUSIANS**, a very strict religious order, founded in the year 1180, by one Bruno.

**CARTILAGE**, *Cartilago*, in anatomy, a simple or similar part of the body, harder than all the other fleshy parts, but much softer than the bones, white, smooth, polished and flexible. The cohesion of the parts is different in different cartilages, and no sensible cavity, cell, or bone, appear in any part of its surface, except minute passages for the blood vessels.

**CARTILAGINOUS**, something partaking of the nature of a cartilage.

**CARTON**, or **CARTOON**, in painting, a design drawn on strong paper, to be afterwards calked through, and transferred on the fresh plaster of a wall to be painted in fresco.

Carton is also used for a design coloured, for working in mosaick, tapestry, &c. The cartons at Hampton-court are designs of Raphael Urbin, intended for tapestry.

**CARTOUCHE**, in military affairs, a case of wood about three inches thick at the bottom, bound about with marlin, holding about four hundred musket balls, besides six or eight balls of iron to be fired out of a hobit, for the defence of a pass, &c.

**CARTOUCHE**, in architecture, an ornament representing a scroll of paper, to receive a motto or inscription.

**CARTRIDGE**, in military affairs, a case of paper or parchment, fitted to the bore of the piece, and holding exactly its charge.

**CARTRIDGE-BOX**, a case of wood, covered with leather holding a dozen musket cartridges.

**CARVING**, that branch of sculpture which regards cutting in wood.

**CARUM**, **CARAWAY**, in botany, a genus of the pentandria digynia class. The fruit is oblong and striated; the involucre consists of but one leaf; and the petals are carinated and emarginated. There is but one species, viz. the caroi, a native of Britain. The seeds have an aromattick smell and pungent taste; and are frequently employed as a stomachick and carminative in flatulent cases.

**CARUNCULA**, in anatomy, any small piece of flesh, or at least, what has the appearance of it.

**CARUS**, in physick, a sudden deprivation of sense and motion affecting the whole body.

**CARYATIDES**, in architecture, a kind of columns or pilasters in the form of women, dressed in long robes after the manner of the Carian people, and serving to support the entablement.

**CARYOCOSTINUM**, in pharmacy, an electuary, chiefly prepared of cloves, white costus, ginger, cummin-seeds, &c. much recommended for purging choler, and breaking away obstructions of cachectick constitutions; also an excellent purge for strong people.

**CARYOPHYLLATA**, in botany, the name by which Tournefort calls the geum and dryas of Linnæus.

**CARYOPHYLLUS**, the pink, in botany, the same with the dianthus of Linnæus. See **DIANTHUS**.

**CARYOPHYLLUS AROMATICUS**, the clove-tree, common in several islands of the E. Indies. The cloves, which are the only part known to us, are properly the cups of the unopened flowers. In shape they somewhat resemble a short thick square nail, of a rusty colour inclining to black: in the inside of each clove are found a stylus and stamina, with their apices: at the larger end shoot out, from the four angles, four little points like a star, in the middle of which is a round ball, of a lighter colour than the rest, composed of four small scales or leaves, which seem to be the unexpanded petals of the flower. The tree is one of those, whose flower is produced above the rudiments of the fruit: the ripe fruit, sometimes brought into Europe under the name of autophyllus, is marked on the top with the remains of the flower; it is about the size and shape of an olive, and contains, under a thin blackish shell, a hard kernel of the same colour, which has a deep longitudinal seam on one side. The cloves are said to be cured by exposing them to smoke, and afterwards drying them in the sun.

Cloves are used as spice in foods, and make an ingredient in most of the family wines, or spirituous cordials. They are in medicine carminative and good against all distempers of the head arising from cold causes. They strengthen the sight, and will alone cure many kinds of head-achs: They are also good against faintings and palpitations of the heart, and against crudities in the stomach. They are given from 3 grains to 6 or 8 for a dose, but are seldom used singly or in their crude state. There is an essential oil obtained from them per descensum, or by distillation in the common way, which possesses all their virtues, and in which



form they are generally used. This oil is carminative, and is an ingredient in the pills of the rougher catharticks. It is also good as an external application to carious bones, and is one of the usual remedies for the tooth-ach, a drop or two of it on cotton applied to the tooth. Its dose internally is no more than a drop or two.

The autophylli are scarce ever met with in our shops. The Dutch preserve them while fresh by way of a sweetmeat, and are fond of them after meals to promote digestion.

Ray and Herman do not allow the caryophyllus regius, or royal clove (so called by the Dutch, from their opinion of its virtues, or rather of its rarity) to be a distinct species, but only a *lusus naturæ* of the common clove.

**CARYOPHYLLUS** *Ruber*, the clove-july-flower, or gilli-flower, in botany, the name of a plant with many smooth, round, jointed stalks, and gramineous leaves, of a bluish green colour, standing in pairs at the joints: the flower is composed of four petals, narrow at the basis but broad and jagged at the top; and surrounded by an oblong cylindrical cup, which is covered at the bottom with four short scales, forming a kind of secondary cup. The calyx after the flower is fallen, becomes a covering to a number of small, black, wrinkled seeds.

**CASCABEL**, the button or knob at the breech end of a cannon.

**CASCADE**, a steep fall of water from a higher to a lower place.

**CASCANS**, in fortification, holes in the form of wells, serving as entrances to galleries, or giving vent to the enemies mines.

**CASE**, among grammarians, implies the different inflexions or termination of nouns, serving to express the different relations they bear to each other, and to the things they represent.

**CASE**, among printers, denotes a sloping frame divided into several compartments, each containing a number of types or letters of the same kind.

**CASE of crown glass**, contains usually twenty-four tables, each table being nearly circular, and about three feet six inches diameter.

**CASE of Newcastle glass**, contains thirty-five tables; of Normandy glass twenty-five.

**CASE-HARDENING**, a method of changing the surface of iron instruments into steel, in order to render those parts capable of resisting any edge tool.

**CASE-SHOT**, in military affairs, imply musket-balls, stones, pieces of old iron, &c. put into cases, and shot out of pieces of ordnance.

**CASEMATE**, in architecture, implies a hollow moulding, which some architects make one sixth of a circle, and others one fourth.

**CASEMATE**, in fortification, a vault, or arch of mason's work, in that part of the flank of a bastion, which is next the curtain, erected to defend the moat, and the face of the opposite bastion.

**CASH**, in commerce, signifies ready money; and also the stock of a trader, merchant, or banker.

**CASH-BOOK**, See the article **BOOK-KEEPING**.

**CASHEW-NUT**, the fruit of the acajou tree, generally called anacardium. See **ANACARDIUM**.

**CASHIER**, a person entrusted with the cash of some publick company.

**CASING of Timber Work**, among builders, signifies the plaistering the outside of a house all over with mortar, and while it continues wet, to draw lines by a ruler with the corner of the trowel, to make it resemble the joints of free-stone.

**CASK**, a vessel of capacity, for holding liquors of various kinds, and also dry goods, as sugars, indigo, &c. but the latter are termed dry casks.

**CASSAVI**, or **CASSADA**, the name of a plant frequent in many parts of the W. Indies, and from the root of which they make a wholesome and nourishing bread.

**CASSIA** *Caryophyllata*, the bark of a tree of the clove kind, brought from the island of Cuba; Jamaica, and other parts of the W. Indies; rolled up in quills, like

cinnamon, but somewhat thinner, rougher on the outside, and of a dark rusty brown colour.

This bark is a warm aromack, nearly of the same kind of smell and taste with the clove spice, but weaker, and with a little admixture, as it were, of the cinnamon flavour. It agrees nearly with cloves also in regard to the solubility and volatility of its active principles. Tinctures of it in rectified spirit, smell and taste strongly of the bark: the watery infusions are considerably impregnated with its smell, but have very little of its taste. On inspissating the spirituous tincture, the spirit which distils has little or nothing of its flavour; the remaining extract smells lightly of the bark, and proves in taste very hot and pungent, though much less so than the spirituous extract of cloves. In distillation with water, it yields a very small portion of essential oil, nearly similar in flavour to oil of cloves, but more pungent than the genuine oil of that spice: the remaining decoction is disagreeably austere and bitterish.

A bark of the same kind is sometimes brought from the E. Indies under the name of culitlawan, or culilawan, a Malaccan compound word, of which the Latin *cortex caryophyllodes*, or clove bark, is said to be a translation. That distinguished in Europe by the name of calilawan, is thicker than the other, and in colour approaches somewhat more to cinnamon, but scarcely differs in smell or taste.

The same with this appears likewise to be the carabaccium of Baglivi; which he describes as being in taste like cloves, but very temperate and grateful, and in colour having a great resemblance to cinnamon; and which, he says, he made use of with great benefit in decoction, for correcting the acrimony and scorbutick dissolution of the lymph, and for strengthening the stomach and promoting digestion.

Rumphius observes, that the outer and inner barks, and the barks of different parts of the tree, differ somewhat in colour and in taste from one another; whence, probably, such differences as may have been observed in those brought under different names into Europe, and that the bark of the root approaches both in appearance and in flavour to saffaias, for which it was in Batavia, frequently substituted.

**CASSIA** *Fistularis*, a hard woody cylindrical pod of a tree resembling the walnut, which grows spontaneously in Egypt and the warmer part of the E. Indies, and has been thence introduced into the West.

The pods or canes are about an inch in diameter, and a foot or more in length; externally, of a dark brown colour, somewhat wrinkled, with a large seam running the whole length upon one side, and another less visible on the opposite one; internally, of a pale yellowish colour, divided by thin transverse woody plates into a number of little cells, containing each a flattish oval seed, with a soft black pulp.

The pulp of cassia has a sweetish taste, followed by more or less of a disagreeable kind of acrimony. The cassia of the East-Indies has a more agreeable sweetness, and less acrimony than that of the West; and hence the former is universally preferred: they may be distinguished from one another by the eye; the oriental canes being smaller, smoother, and thinner rined, and their pulp of a deeper shining black colour than the Occidental. The lighter canes of either sort, and those in which the seeds rattle on being shaken, are generally rejected: in these, indeed, the pulp has become dry, but it does not necessarily follow that it is damaged: it loses nothing in drying but its aqueous humidity; and by this loss it should seem to be effectually secured from growing mouldy or sour, inconveniences to which in its moist state it is very subject.

The pulp of cassia, whether moist or dry, dissolves both in water and in rectified spirit; readily in the former, slowly and difficultly in the latter, and not totally in either: the part which remains undissolved appears to be of little or no activity. It is usually extracted by boiling the bruised pods in water, and evaporating the strained solution to a due consistence: the exhaling vapour carries off nothing considerable of the cassia. As it is very apt to grow sour in keeping, only small quantities should be prepared at a time.



Cassia, in doses of a few drams, is a gentle laxative; of good use in costive habits, in inflammatory cases where purgatives of the more acrid or irritating kind can have no place; and, as Geoffroy observes, in the painful tension of the belly which sometimes follows the imprudent use of antimonials. It is rarely given in such doses as to have the full effect of a cathartick; the quantity necessary for this purpose, an ounce and a half or two ounces, being apt to nauseate the stomach, and produce flatulencies and gripes, especially if the cassia is not of a very good kind: mild aromatics, and dilution with warm liquors, are the best correctives.

It is sometimes actuated with the stronger purgatives, or with the antimonial emeticks; of which last it is said by some to diminish the activity so far, that four grains and a half of the tartarum emeticum may be taken in a decoction of cassia, by those who can bear but one grain and a half of the antimonial preparation by itself. It is often joined also as an auxiliary to the milder purgatives, as crystals of tartar, tamarinds, and manna; and of these, particularly of the latter, it is supposed to increase the cathartick virtue; a mixture of four drams of cassia and one and a half or two of manna, being said to purge as much as twelve drams of cassia or thirty-two of manna by themselves.

It is observable, that during the use of cassia, the urine appears frequently of a green colour, and sometimes, where the quantities taken are considerable, of a dark brown or blackish.

*CASSIA Ligna*, the bark of a tree of the cinnamon kind, brought from the E. Indies; exactly resembling cinnamon in appearance, but distinguishable by its breaking short or smooth, while cinnamon breaks fibrous or shivery, like wood.

This bark resembles cinnamon in aromatick flavour as well as in external appearance; but differs in being weaker, or containing less active matter, and in its abounding with a viscous mucilaginous substance. Chewed, it dissolves as it were in the mouth into a kind of slime: powdered and boiled in water, it renders a considerable quantity of the fluid thick and glutinous, so as to concrete on cooling into the consistence of a jelly.

Rectified spirit of wine, digested on the bark, dissolves and extracts its aromatick matter; the powder retaining its mucilage, so as to form a jelly with water as at first. The aromatick part may be separated also by distillation with water; in which process, if a large quantity of cassia is used, a small portion of essential oil may be collected. The spicy principle of the cassia, thus freed from the mucilage, in the form of spirituous tincture, or spirituous extract, or distilled water, or essential oil, appears the same with that of cinnamon; provided, in regard to the distilled fluids, that they have not received an empyreumatick taint in the operation, an inconvenience to which they are very subject on account of the mucilaginous matter swelling up and burning to the vessel.

Cassia lignea was employed by the ancients as a succedaneum to cinnamon, of which it was reckoned equivalent to half its own quantity. At present it is not unfrequently mixed with that spice in the shops, but is scarcely ever made use of under its own name.

*CASSINE*, in botany, the cassia-berry-tree, a genus of plants, whose leaves are used in South America, in the manner of tea. The flower of this plant is open, divided into five suboval obtuse segments, larger than the cup; the fruit is a roundish berry, with three cells, each containing a suboval seed.

*CASSIOPEA*, in astronomy, a constellation of the northern hemisphere, situated next to Cepheus, and opposite to the great bear on the other side of the pole.

In the year 1572, there appeared a comet in this constellation, which continued visible about eighteen months, and then disappeared again. This comet appeared to the naked eye about the magnitude and brilliancy of Jupiter, which made some imagine it only to be a new star that made its appearance and then vanished again; but such must be very superficial or little practised in astronomy or astronomical observations. However, it greatly alarmed the astronomers of that age,

many of them wrote dissertations upon it, to prove that it was the same comet that appeared to the magi, or wise men of the east, at the birth of Christ.

The number of stars in cassiopea are, in Ptolemy's catalogue, 13; in Tycho's 28, and in Mr. Flamsteed's, fifty-five.

*CASSOCK*, or *CASSULA*, a kind of robe worn over the rest of the habit by the clergy. Probably the name *cassock*, as well as the thing, is derived from the ancient *Carocalla*, a sort of upper garment, which hung to the heels. Or from the French *casaque*, an horseman's coat.

*CASSOWARY*, in ornithology, makes a distinct genus of birds, of the order of the gallinæ; the characters of which are these: its feet have each three toes, all placed forward; and its head is ornamented with a kind of bony comb and naked wattles. There is only one species of this genus, which is a robust, large and thick bird, measuring four feet and an half when it stretches out its neck.

*CASSUMUNAR*, in the materia medica, a root approaching to that of zedoary. It is cardiack and sudorifick, and famous in nervous cases: it is also an ingredient in many compositions, and is prescribed in powders, boluses, and infusions. Its dose is from five to fifteen grains.

*CASTANEA*, the chefnut-tree, the name of a well known genus of trees, and of which there are five species. Linnæus makes the chefnut-tree a species of the fagus. See *BEECH Fagus*.

The chefnut-tree is propagated by planting the nuts, which should be done in February, in beds of fresh undunged earth. The plants will appear in April, when the beds must be carefully weeded, for otherwise the greater part of the young trees will die. In these beds the plants may remain for two years, when you should remove them into a nursery, at a wider distance. The best season for transplanting these trees is either in October, or the latter end of February; but October is the best season: the distance they should have in the nursery, is three feet, row from row, and one foot in the rows.

After having remained three or four years in the nursery, they will be fit for transplanting, either in rows, for avenues to a house, or in quarters, for wilderness plantations; but if you intend them for timber, it is much the better method to sow them in furrows, as is practised for oaks, &c. and let them remain unreduced; for these trees are apt to have a downright tap root, which being hurt by transplanting, is often a check to their upright growth, and causes them to shoot out into lateral branches, as is the case with the oak, walnut, &c.

*CASTANET*, a musical instrument, much used by the Moors, Spaniards, and Bohemians, to accompany their dances.

*CASTELLAN*, the title given to the senators of the lower class in Poland.

*CASTING*, in foundery, implies the operation of running any sort of metal into a mould prepared for that purpose.

*CASTOR*. See *CASTOREUM*.

*CASTOR*, in astronomy, the name of one of the twins in the constellation gemini; and also of the star marked alpha by Bayer in the same constellation.

*CASTOR* and *POLLUX*, a name given by the ancients to a species of meteor, which often appears in storms at sea, sticking to some part of the ship, in the form of fire-balls. This meteor is nothing more than the electric matter discharged from the clouds.

*CASTOREUM*, *CASTOR*, the inguinal glands of the castor or beaver, a four-footed amphibious animal, frequent in several parts of Europe, and in North-America. These glands are of different shapes and sizes, covered with a thick skin, including an unctuous liquid matter, which in keeping grows dry and hard: on cutting the dry cods, as they are called, they are found full of a brittle friable substance, of a brownish red colour, interspersed with fine membranes and fibres exquisitely interwoven. The best castor comes from Russia, in large, round, hard cods; an inferior sort, smaller



smaller and moister, from Dantzick; the worst of all from New England, in longish thin cods.

Russia castor has a strong not agreeable smell, and a biting bitterish nauseous taste: the other sorts are weaker than that of Russia, yet more disagreeable. It is generally looked upon as one of the capital nervine, antispasmodick, and antihysterick medicines: its virtues have undoubtedly been much exaggerated; but though they are not near so great as they have by most writers been represented, they appear nevertheless to be considerable. The common dose is from two or three grains to a scruple; though it has been sometimes taken by drams, and these doses very often repeated.

Rectified spirit, proof spirit, and water, extract, by the assistance of heat, nearly all the matter of castor: rectified spirit dissolves most readily the finer and less ungrateful, and water the more nauseous bitter parts: proof spirit acts equally, but difficultly, on both. Three ounces of powdered Russia castor, digested with a gentle heat, for three days, in a quart of rectified spirit, communicated a deeper redish tincture, and a stronger though rather less ungrateful taste, than four ounces did to the same quantity of proof-spirit by maceration without heat for ten days. On digesting in the two spirits equal quantities of the powder, with equal degrees of heat, for ten or twelve hours, the tincture in proof-spirit proved sensibly most ungrateful, and that in rectified-spirit possessed most perfectly the specific flavor of the castor: an infusion in boiling water was bitterer and more nauseous than either. The castor remaining after the action of water, retained a little of its flavour, but nothing of its nauseous bitterness: that left by rectified-spirit retained a little of the latter, but nothing of the former; and the residuum of proof-spirit a little of both.

In distillation it gives over to water the whole of its smell and flavour: a quart of water, distilled from an ounce of Russia castor, receives a considerably strong impregnation, but gradually loses the greatest part of it in being kept. It is said, that on submitting to this operation, large quantities of the castor, a small portion of essential oil is obtained, which smells exceeding strongly, and diffuses its ungrateful scent to a great distance. This odorous and most active prince of the castor is carried off by water in a very gentle heat; infusions or light decoctions, which are very nauseous, yielding, however slowly inspissated, a brittle extract, which has nothing of the specific flavour of the drug, and proves in taste but weakly though disagreeably bitterish. Rectified-spirit on the other hand, distilled from the tincture made in that menstruum, brings over scarcely any sensible impregnation; nearly all that it had extracted from the castor, remaining entire in the inspissated mass, which proves of an unctuous consistence, not easily reducible to dryness.

Castor is commonly joined in prescription with the deobstruent fetid gums, volatile alkaline salts, the volatile oily spirits, and other materials of similar intention. The volatile oily spirits are well adapted also as menstrua for dissolving the active matter of the castor, at the same time that they prove in many cases excellent additions to its virtue, as particularly in some hysterick disorders, and the several symptoms which accompany them: in this view, an ounce of Russia castor, and half as much asafetida, are digested about six days, in a close vessel, with a pint of the volatile spirit.

CASTRATION, in surgery, the operation of gelding, or extirpating the testicles.

CASU CONSIMILI, in law, a writ of entry granted where a tenant, by courtesy or for life, aliens either in fee, in tail, or for the term of another's life. It is brought by him in reversion against the person, to whom such tenant does so alien to the prejudice of the reversioner, in the tenant's life time.

CASU PROVISIO, in law, a writ of entry founded on the statute of Gloucester, where a tenant in dower aliens the lands she so holds in fee, or for life; and lies for the party in reversion against the alienor.

CAT, *felis*, a well known quadruped, of the order of the feræ, or beasts of prey. See the article *FELIS*.

The domestick cat is diversified with an almost infi-

nite variety of colours and streaks; but the natural colour, in a wild state, is a brown tawney, variegated with streaks of a pale whitish colour. In France, the cats are all of a bluish lead-colour; and, in the north of Europe, they are all over white.

CAT-MINT, in botany, the English name of the *cataria* of botanists.

CAT-HARPINGS, in a ship, small ropes running in little blocks from one side of the shrouds to the other, near the deck. Their use is to force the shrouds, and make them tight, for the more security and safety of the masts.

CAT-HEAD, on shipboard, a short piece of timber in a ship, lying aloft right over the hawse, having at one end two shivers, wherein is reeved a rope, with a great iron hook fastened to it, called

CAT-HOOK. Its use is to trice up the anchor, from the hawse to the top of the fore-castle.

CAT-HOLES, in a ship, are over the parts as right with the capstan as they can be: their use is to heave the ship astern, upon occasion, by a cable, or a hawse, called stern-fast. See the article *STERN-FAST*.

CAT of the Mountain, *Catus Pardus*, an animal of the cat kind, about the size of a mastiff, variegated with longitudinal black streaks on the upper part of the body, and black spots on the under part.

CAT-SALT, a name given by our salt-workers to a very beautiful granulated kind of common salt. It is formed out of the bittern or leach-brine, which runs from the salt when taken out of the pan. When they draw out the common salt from the boiling-pans, they put it into long wooden troughs, with holes bored at the bottom for the brine to drain out; under these troughs are placed vessels to receive this brine, and across them are placed certain small sticks, to which the cat-salt affixes itself in very large and beautiful crystals. This salt contains some portion of the bitter purging salt, and is very sharp and pungent, and is white when powdered, though pellucid in the mass. It is used by some for the table, but the greatest part of what is made of it, is used by the makers of hard soap.

CATABIBAZON, in astronomy, the moon's descending node, called also dragon's tail.

CATACAUSTICK CURVES, in the higher geometry, that species of caustick curves which are formed by reflection. See the article *CAUSTICK CURVE*.

These curves are generated after the following manner. If there be an infinite number of rays as AB, AC, AD, &c. (*plate XVI. fig. 4.*) proceeding from the radiating point A, and reflected at any given curve B DH, so that the angles of incidence be still equal to those of reflection; then the curve BEG, to which the reflected rays BI, CE, DF, &c. are tangents continually, as in points I, E, F, is called the catacaustick curve.

If the reflected IB be produced to K, so that AB = BK, and the curve KL be the evolute of the catacaustick BEG, beginning at the point K; then the portion of the catacaustick BE = AC - AB + CE - EI continually. Or if any two incident rays as AB, AC be taken, that portion of the caustick that is evolved while the ray AB approaches to a coincidence with AC, is equal to the difference of those incident rays + the difference of the reflected rays. When the given curve is a geometrical one, the catacaustick will be so too, and always rectifiable.

The catacaustick of a circle is a cycloid, formed by the revolution of a circle along a circle. The caustick of the vulgar semicycloid, when the rays are parallel to the axis, is also a vulgar cycloid, described by the revolution of a circle upon the same base. The caustick of the logarithmick spiral is the same curve, only set in a different position.

CATACHRESIS, in rhetorick, a trope which borrows the name of one thing to express another. Thus Milton describing Raphael's descent from the imperial heaven to paradise, says,

Down thither prone in flight  
He speeds, and thro' the vast ætherial sky  
Sails between worlds and worlds.

CATACOMB, a grotto or subterraneous place for the burial of the dead.

The



The term is particularly used in Italy, for a vast assemblage of subterraneous sepulchres, three leagues from Rome, in the *via Appia*, supposed to be the sepulchres of the ancients. Others imagine these catacombs to be the cells wherein the primitive Christians hid themselves. Each catacomb is three feet broad, and eight or ten high, running in form of an alley or gallery, and communicating with one another.

**CATACOUSTICKS**, the doctrine of reflected sounds. See the article **ECHO**.

**CATADIOPTICAL TELESCOPE**, the same with reflecting telescope. See the article **TELESCOPE**.

**CATADROME**, an engine resembling in some measure a crane, used by builders in raising heavy bodies.

**CATAFALCO**, in architecture, a scaffold of timber, decorated with sculpture, painting, &c. for supporting the coffin of the deceased during the funeral solemnity.

**CATALEPSY**, *Catalepsis*, among physicians, a species of apoplexy when the limbs are easily flexible, and continue in what ever position they are placed.

**CATALOGUE**, a list, or series of the names of books, men, or other things, according to some determined order.

**CATALOGUE of Stars**, an enumeration of the constellations, with the stars belonging to each, put down in a list according to their place, or order of passing the meridian, with their number, both formed and unformed, as likewise their magnitude, variations, &c. or whatever may be of use to the practical astronomer, for the more readily applying any, or such of them, as is most suitable, to adjust the motions of the planets, comets, &c.

Pliny informs us in his Natural History, that Hipparchus of Rhodes, observing the appearance of a new star, began to think there might be changes amongst the fixed stars; he therefore began to construct a catalogue of them, that in time to come, if any new stars should appear, or any of those already observed should vanish or diminish, such changes could not escape unnoticed to after-ages.

The most ancient catalogue is that of Ptolemy, which contains 1026 stars. These were chiefly copied from Hipparchus, only he corrected their places by his own observations, made in the beginning of the reign of Antoninus Pius, about the year 140.

According to the learned Hyde, the Arabians were the next after Ptolemy, who made a catalogue of the stars; he mentions several, and published the most considerable among them in Arabick, with a Latin translation: it was made by Ulug Beigh, grandson to Tamerlane, from his own observations made at Samercand. The number of stars in this catalogue were 1022, and their places settled to the year 1437.

The third who made a catalogue from his own observations, was Tycho Brahe, who determined the places of 777 stars for the year 1600: which Kepler, from other observations of Tycho's, afterwards increased to 1000, which he published with the Rudolphine tables.

At the same time William, landgrave of Hesse, with the assistance of Rothmannus and Justus Byrgius, settled the places of 400 fixed stars by his own observations, which Hevelius prefers to those of Tycho. Ricciolus, in his *Astronomia Reformata*, determined the places of 101 stars for the year 1700, from his own observations. Dr. Halley, in the year 1677, at the island of St. Helena, observed 350 southern stars, not visible in our horizon. The same labour was repeated by F. Noel in 1710, who published a new catalogue of the same stars, settled for the year 1687. The next was J. Hevelius, who made a catalogue of 1888 fixed stars, whereof 950 had been observed by the ancients, 350 by Dr. Halley, and 603 by himself.

Bayer in his *Uranometria*, published a catalogue of 1160 stars, though not from his own observations, but chiefly compiled from those of Ptolemy and Tycho. What makes this catalogue valuable is, that each star in every constellation is marked with some letter; so that the biggest star in every constellation is denoted by

the first letter of the Greek alphabet, and the next biggest by the second, &c. but if the constellation contains a greater number of stars than there are letters, then those that remain are marked by the Roman alphabet: by this means every star is easily distinguished.

But the largest and most complete catalogue the world ever saw, is that called the British Catalogue, owing to the labours of that assiduous astronomer, Mr. Flamsteed; it contains 2936 stars, many of which are so small, that they cannot be perceived by the naked eye.

**CATAMENIA**, in medicine, the same with menses. See the article **MENSES**.

**CATANANCHE**, in botany, the name of a genus of plants, ranged by Linnaeus among the syngenesia polygamia. The flower is monopetalous, ligulated, and longer than the calyx. The seeds are solitary, compressed, and crowned with a little cup of four or five hairs.

**CATAPASM**, among the ancient physicians, implied any medicine reduced to power.

**CATAPHRYGIANS**, in ecclesiastical history; a sect of hereticks, who asserted that the holy Spirit had forsaken the church, and that Montanus was to be considered as a true prophet, and his tenets religiously embraced. They appeared in Phrygia about the middle of the second century.

**CATAPLASM**, an external topical medicine, prepared of ingredients of different virtues, according to the intention of the physician. Hence there are different sorts of cataplasms with respect to the matter of which they consist, as emollient, resolvent, discutient, suppurative, corroborative, anodyne, and antiseptic cataplasms. They are commonly applied hot, or lukewarm, rolled up in linen cloths, which by means of the oils which are added preserve heat for a considerable time; for which end also some, upon these, apply a swine's or ox's bladder, and sometimes on the top of all apply an earthen tile.

**CATAPULTA**, in antiquity, a military engine contrived for the throwing of arrows, darts and stones upon the enemy. Some of these engines were of such force, that they would throw stones of an hundred weight. Josephus takes notice of the surprising effects of these engines; and says, that the stones thrown out of them beat down the battlements, knocked off the angles of the towers, and had force sufficient to level a very deep file of soldiers.

**CATAPRACT**, in hydrography, a large fall of water in a river, occasioned by rocks, or other obstacles in the channel, stopping up the stream, and over which the water tumbles with great noise and impetuosity.

**CATARACT**, in medicine and surgery, a disorder of the humours in the eye, by which the pupilla that ought to appear transparent and black, looks opaque, grey, blue, brown, &c. by which vision is variously impeded, or totally destroyed.

The ordinary and most common cause of cataracts, is from an opacity in the crystalline lens: it appears that it may sometimes be caused by a membrane in the aqueous humours, which cause was the only one ascribed to cataracts till the present century.

Cataracts have been distinguished by surgeons and oculists into various species, as into recent and inveterate, incipient and confirmed, mature and immature, simple and complicated, immovable and shaking, milky and purulent, true and spurious, and into curable and incurable. There is scarce any disorder, the event of which is more uncertain than that of a cataract: medicines will generally have little or no effect when the disorder is confirmed, or inveterate, notwithstanding what some may boast of their wonderful arcana for this purpose: almost the sole relief is therefore had from the surgeon's hand and instruments. For the process of this operation, see the article **COUCHING of Cataracts**.

Though most people reject all methods of treating cataracts by medicines as useless and trifling, yet there are some cases in this disorder which ought to be recommended to the care of the physicians, who by directing a proper regimen and course of physick, adapted



Centre of Oscillation Centre of Oscillation

Fig. 1.

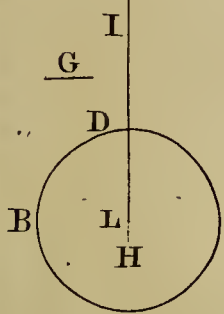
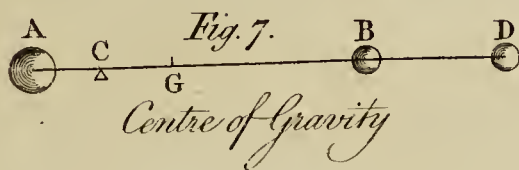
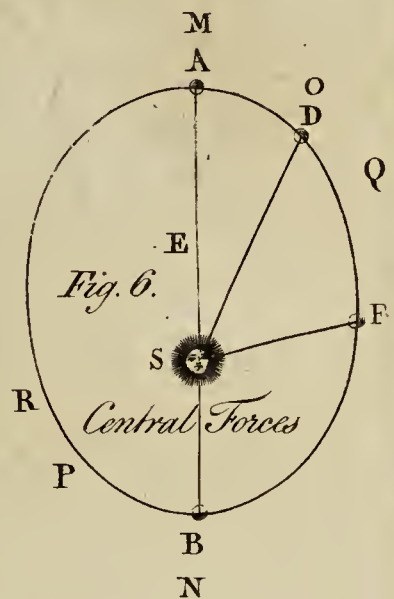
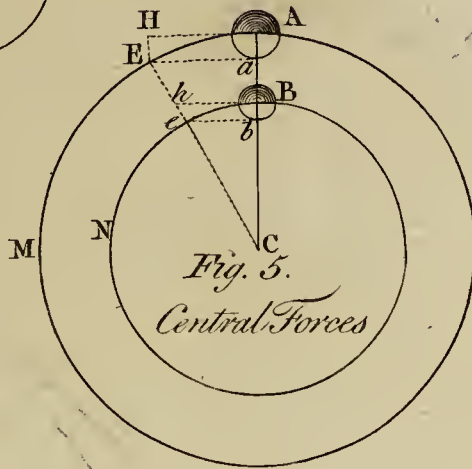
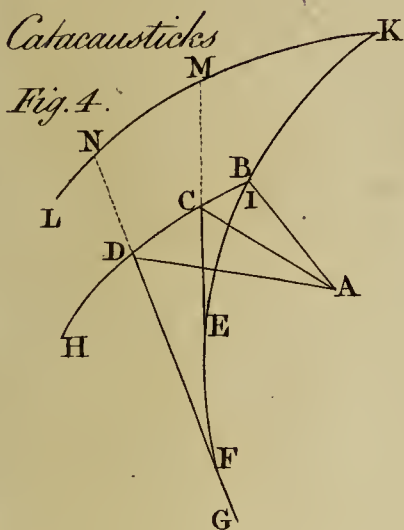
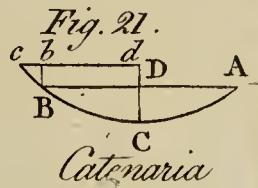
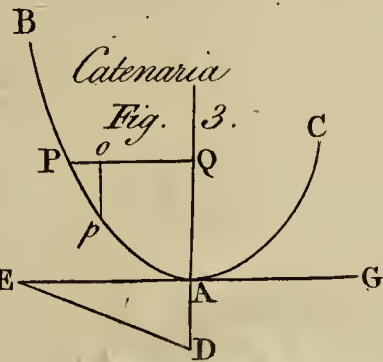
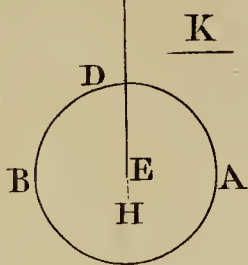
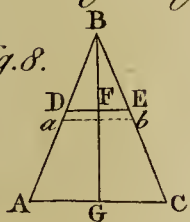


Fig. 2.



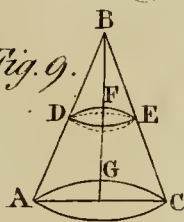
Centre of Gravity

Fig. 8.



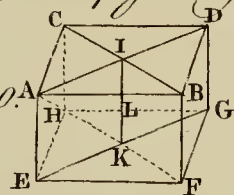
Centre of Gravity

Fig. 9.



Centre of Gravity

Fig. 10.



Centre of Gravity

Fig. 11.

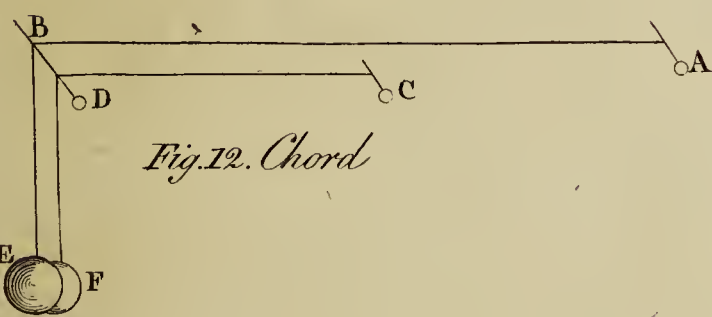
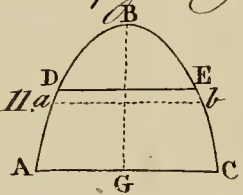
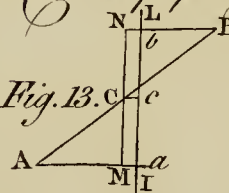


Fig. 12. Chord

Centre of Gravity

Fig. 13.



Centre of Gravity

Fig. 14.

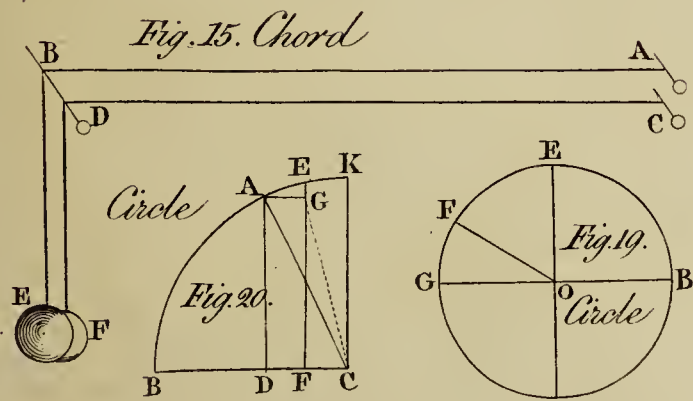
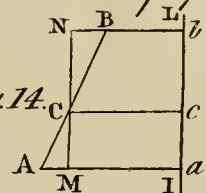


Fig. 15. Chord

Fig. 20.

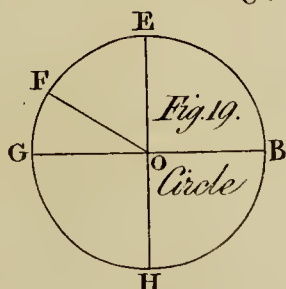


Fig. 19.

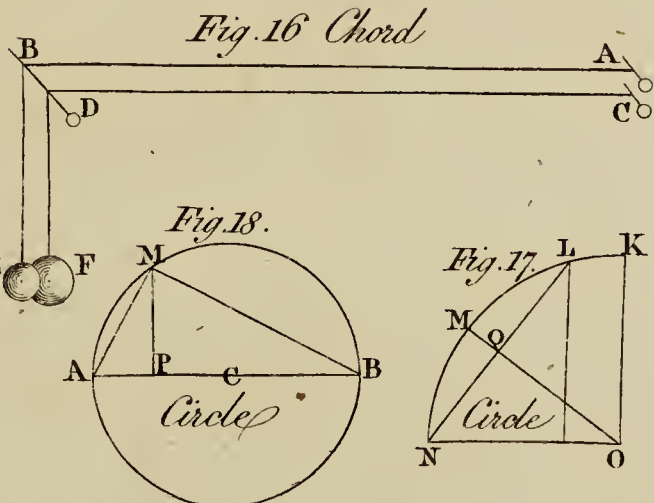


Fig. 18.

Fig. 17.







adapted to the patient's habit, age, and other circumstances, may by the assistance of nature remove cataracts beyond expectation.

*The method of couching a CATARACT.* Having placed your patient in a convenient light, and in a chair suitable to the height of that you yourself sit on, let a pillow or two be placed behind his back, in such a manner, that, the body bending forward, the head may approach near to you: Then inclining the head a little backward upon the breast of your assistant, and covering the other eye, so as to prevent its rolling, let the assistant lift up the superior eye-lid, and yourself depress a little the inferior one: This done strike the needle through the tunica conjunctiva, something less than one tenth of an inch from the cornea, even with the middle of the pupil, into the posterior chamber, and gently endeavour to depress the cataract with the flat surface of it. If, after it is dislodged, it rises again, though not with much elasticity, it must again and again be pushed down: if it is membranous; after the discharge of the fluid, the pellicle must be more broken and depressed: if it is uniformly fluid, or exceedingly elastick, we must not continue to endanger a terrible inflammation by a vain attempt to succeed. If a cataract of the right eye is to be couched, and the surgeon cannot use his left hand so dexterously as his right, he may place himself behind the patient, and use his right hand.

I have not recommended the speculum oculi (which we cannot however well do without, unless the patient resolutely determines to hold the eye still) because, upon the discharge of the aqueous humour through the puncture, the eye, being somewhat emptied, more readily admits of the depression of the crystalline humour, than when pressed upon by the instrument.

In treating the succeeding inflammation (when it happens, for sometimes there is none) you are to refrain from those collyria that are charged with powders; for the thinner parts, flying off, leave a gritty substance in the eye, which must be pernicious. Bleeding and other gentle evacuations are found absolutely necessary. The use of cool applications externally is most easy to the eye; but after all there will sometimes ensue a troublesome ophthalmia, which, with the uncertainty there always is of success, after the operation, have deterred most surgeons from undertaking it, and till lately, from studying the nature of the disease. *Sharp's Surgery.*

CATARRH, in medicine, a distillation or defluxion from the head upon the mouth, and aspera arteria, and through them upon the lungs.

CATASTASIS, among the ancients, implied the third part of the drama, or that wherein the plot, intrigue, or action, is carried on and heightened, till the whole is ripe for the unravelling in the catastrophe.

CATASTROPHE, in dramatick poetry, the fourth and last part in the ancient drama, or that immediately succeeding the catastasis; or, according to others, the third only; the whole drama being divided into protasis, epitasis, and catastrophe; or in the terms of Aristotle, prologue, epilogue, and exode.

The catastrophe clears up every thing, and is nothing else but the discovery or winding up of the plot. It has its peculiar place, for it ought entirely to be contained, not only in the last act, but in the very conclusion of it; and when the plot is finished, the play should be so too. The catastrophe ought to turn upon a single point, or start up on a sudden.

The great art in the catastrophe is, that the clearing up of all difficulties may appear wonderful, and yet easy, simple, and natural.

It is a very general, but very preposterous, artifice of some writers, to shew the catastrophe in the very title of the play. Mr. Dryden thinks that a catastrophe resulting from a mere change in sentiments and resolutions of a person, without any other machinery, may be so managed, as to be exceeding beautiful. It is a dispute among the critics, whether the catastrophe should always fall out favourably on the side of virtue, or not. The reasons on the negative side seem the strongest. Aristotle prefers a shocking catastrophe to a happy one; because the moving of terror and pity, which is the aim of tragedy, is better effected by the

former than the latter. The catastrophe is either simple or implex; the first is that in which there is no change in the state of the principal persons, nor any discovery or unravelling, the plot being only a mere passage out of agitation into quiet and repose. In the second, the principal persons undergo a change of fortune, in the manner already defined.

CATCH, or CATCHES, among mechanicks, imply those parts, which lay hold of others, in order to stop their motion, or keep them fast in their position.

CATCH-FLY, in botany, the English name for a species of lychnis now greatly cultivated in the English gardens.

The double flowering sort of catch-fly was accidentally obtained from the seeds of the single; and has not been known above forty years in the English gardens: As this sort never produces seeds, so it can only be propagated by parting and slipping the roots; the best time for this is in autumn, at which time every slip will grow. The roots of this sort multiply so fast as to make it necessary to transplant and part them every year; for when they are suffered to remain any longer, they are very apt to rot. It delights in a light moist soil.

It has the name of catch-fly, from a glutinous liquor, almost as clammy as bird-lime, sweating out of the stalks under each pair of leaves; so that the flies, which happen to light on these places, are fastened to the stalk, where they die.

CATCH-LAND, a name given to such land as is not certainly known to which parish it belongs: and therefore the minister who first gets the tythes of it, enjoys it for that year.

CATCH-WORD, among printers, implies the word placed at the bottom of each page, and which is always the first on the page succeeding.

CATECHISM, an institution commanded by the protestant church, to be learned before confirmation.

CATECHU, in the materia medica, the name of a troch consisting of japan earth and gum arabick, each two ounces, and of sugar of roses sixteen ounces, beat together, with a little water. It is recommended as a mild astringent, &c.

CATECHUMEN, a name given by the primitive christians, to a person who was preparing himself for baptism.

CATEGORICAL, whatever partakes of the nature of a category.

CATEGORY, *κατηγορία*, in logick, a series or order of all the predicates or attributes contained under any genus.

The school philosophers distribute all the objects of our thoughts and ideas into certain genera or classes, not so much, say they, to learn what they do not know, as to communicate a distinct notion of what they do know; and these classes the Greeks call categories, and the Latins predicaments.

Aristotle made ten categories, viz. quantity, quality, relation, action, passion, time, place, situation, and habit, which are usually expressed by the following technical distich.

*Arbor, sex, servos, ardore, refrigerat, ustos;  
Cras ruri stabo, nec tunicatus ero.*

But as the series of categories is entirely arbitrary, some philosophers think all nature may be better considered under these seven things; spirit, matter, quantity; substance, figure, motion, and rest: and others make but two categories, substance and accident.

CATENARIA, the name of a curve line formed by a rope or chain, hanging freely from two points of suspension, whether the points be, or be not, horizontal.

The nature of this curve was sought for in vain during the time of Galileo; but in the year 1690, M. Bernouilli proposed it as a problem to the mathematicians of Europe, which gave occasion to its being attentively considered; and at last its properties were investigated; and it appeared to be a curve of the mechanical kind, or one that cannot be expressed by a finite algebraical equation.



If you suppose a line heavy and flexible, firmly fixed by its extremes to the points AB (*plate XVI. fig. 21.*) its weight will bend into the curve ACB, called the catenary, whose fundamental property (if DB, *dc*, be parallel to the horizon, CD perpendicular to AB, and Bb parallel to CD, and the points D and *d* infinitely near to one another, and *a* be any given quantity) will be this, viz.  $bc : Bb :: a : CB$ . The demonstration of this property, as also of several others, may be seen in what was published by Dr. Gregory, in the year 1697, for the month of August. See also its construction and nature by Mr. John Bernouilli in the *Acta Eruditorum*, for the year 1691.

Let BAC (*plate XVI. fig. 3*) be a very slender chain, or rather a mathematical line, flexible throughout by any small force, which can neither be extended nor contracted. This, suspended by its ends BC, by the force of its own weight, equally diffused through all its equal particles, is stretched into the curve BpAC: it is required to find any points of this curve.

If a plane be supposed to pass through its ends B, C, perpendicular to the horizon; it is evident, that all the points of the proposed curve are situated in this plane, and each of them will descend as low as possible. Through its lowest point A, draw AQ perpendicular to the horizon, and let P $\circ$ Q, drawn from any point P, be perpendicular to it, and through *p*, being the nearest point to P possible, let *p* $\circ$  be drawn parallel to AQ; call AQ, *x*; PQ, *y*; and the arch AP, *z*; then will the very small lines *p* $\circ$ , P $\circ$ , P*p*, be to one another, as *x*, *y*, *z*. Then because the arch AP is sustained in equilibrio, by the force of its weight, whose direction is parallel to the line *op*, by the force of the contiguous arch AC drawing according to the direction of the tangent at A, parallel to the line P $\circ$ , and by force of the contiguous arch PB, drawing in the direction of the line *p*P: it is evident from mechanicks, that these forces are to one another, *op*, *o*P, *p*P, or as *x*, *y*, *z*. Therefore, if the weight of the arch AP be expressed by its length *z*, and the given force, drawing the arch AC, be expounded by a given length *a*, it will be  $\dot{x} : \dot{y} :: z : a$ ; and so  $\dot{x} : \sqrt{\dot{x}\dot{x} + \dot{y}\dot{y}} = z : z$ .  $\sqrt{a^2 + z^2}$ .

Therefore  $x = \frac{zz}{\sqrt{aa + zz}}$ ; and so  $a + x = \sqrt{aa + zz}$ : wherefore  $z = \sqrt{a + x^2 - aa} = \sqrt{2ax + xx}$ . Wherefore, if the right line QA be continued downwards to D, so that AD be = *a*, and in the tangent AE be taken AE = to the arch AP, and DE be joined: this will be equal to DQ. Wherefore, if AE, the length of an arch AP, be given, as also AQ, the height of the said arch, there will be given AD = *a*, by joining QA and AE, cutting the same at right angles: for the perpendicular will pass through the point D. And, AD being once given, from thence will be given AE, the length of the arch AP, whose altitude AQ is given, by describing a circle from the centre D, with the distance QA, which cuts AE in E; and these are the mutual relations of the parameter AD, the arch AP, and its altitude AQ, let us now consider its breadth.

From what has been already said,  $\dot{y} = \frac{ax}{z} = \frac{ax}{x\frac{1}{2}\sqrt{2a+x}}$ .

And the fluent of this last expression will be an hyperbolick space: which space may be measured by the logarithms. So that PQ will be the logarithm of the ratio between DE + EA and AD, or of AP + AQ to AP - AQ (which ratio is equal to the former) when the length of the line AD is 0.434294481903. So that AD being given or found, as above; if any points Q be taken in the axis AQ, so many correspondent points P of the curve will be had.

CATERPILLAR, *Eruca*, in zoology, the name of the butterfly-class of insects, in their reptile or worm-state.

It is well known that all winged insects pass through a reptile state, before they arrive at perfection: this great change from a worm to a fly, or butterfly, was for-

merly esteemed a real metamorphosis of one animal to another; but later discoveries have put it beyond all doubt, that the embryo-butterfly, with all the lineaments of its parent, is contained within the external cases or coverings of the caterpillar. When the included animal has acquired a sufficient degree of strength, these coverings are thrown off, and it appears in its genuine or most perfect form of a fly, or butterfly. See FLY and BUTTER-FLY.

It is necessary, however, before the animal can get rid of these coverings, that it pass through a state of rest, called by naturalists the nymph or chrysalis-state. See the article NYMPH.

Whoever desires to have a more full account of these animals in their reptile and chrysalis-state, may consult the second volume of Reaumur's History of insects.

Mr. Hitt observes, that there are two sorts of caterpillars, at least those of two colours, which feed upon fruit-trees, the one black and the other green. The black generally make their appearance in March, if the season be dry, upon the pear, apple, and several other trees.

The green caterpillars, which may, perhaps, be the same with the former at their first appearance, till their colour is gradually changed by living wholly on green food, are never seen so early in the spring as the former; but are very prejudicial to both the young branches and fruit of the apricot, cherry, plum, apple, pear, currant, goose-berry, &c.

When the caterpillars are first perceived upon the wall or dwarf trees, whether before or after they are wrapt up, a brine should be prepared, and the trees swept all over with a brush or besom dipt in it. This will destroy many of the insects, by beating some off, and killing others. This work should be often repeated, if there be a necessity for it, as there generally is in dry seasons. Perhaps a small engine would be the properest and most effectual instrument for this work.

But gentlemen, who have leisure sufficient, may easily preserve their fruit-trees from the ravages of caterpillars, by carefully inspecting them every day in the spring; for it will easily be seen when a bunch of blossom-leaves, or young fruit, are joined together by a caterpillar; and, on the first discovery, the leaves are to be separated by the hand, and the caterpillars killed; this will save a young branch or bunch of fruit, which would otherwise have been certainly destroyed. Whoever perseveres in this work will never have much of their fruit destroyed by such insects, which experience has sufficiently demonstrated to be more destructive to the fruit, than any other causes that happen in the spring, though many will attribute the scarcity of fruit to blasts or lightnings, or to the branches being sun-burnt, which are the common constructions put upon the effects of these insects.

When standard trees are properly ordered with cutting and dressing, they will not be much subject to be infected with caterpillars; for by taking off the old rind, and cleaning the cankered parts of those trees, many of the insects are destroyed, together with their eggs concealed in those places; and by keeping the branches thin and open, they are more easily shaken off by the winds.

CATERPILLAR-EATERS, a small worm, produced from the eggs of certain flies, which deposit them in the bodies of caterpillars, where they are hatched, and afterwards devour the creature, whose vital warmth gave them being.

CATHÆRETICKS, in pharmacy, are the same with caustick medicines, or those used in eating down fungous flesh.

CATHARISTÆ, in ecclesiastical history, a branch of the Manichees, who held it unlawful to eat flesh.

CATHARTICKS, in pharmacy, medicines that promote evacuations by stool, generally called purgatives.

CATHEDRA, among ecclesiastical writers, implies a bishop's seat, see, or throne.

CATHEDRAL, a church in which is a bishop's see, or throne.

CATHETER,



**CATHETER**, in surgery, a tubular instrument, generally made of silver, to be introduced into the bladder, in order to search for the stone, or discharge the urine when suppressed.

**CATHETUS**, in geometry and architecture, implies a line falling perpendicularly on another line or surface.

**CATHOLICK**, in a general sense, implies any thing that is general or universal.

**CATHOLICON**, in pharmacy, a kind of soft purgative electuary, used formerly as a gentle purge in most cases.

**CATKIN**, a name given to amentaceous flowers, whose summits hang down in the form of a rope, or cat's tail.

**CATLIN**, a name given by surgeons to a particular sort of knife, used in cutting off corrupted parts of the body.

**CATOCHE**, among physicians, implies a species of epilepsy whereby the patient is rendered, almost instantly, as immovable as a statue.

**CATOPTRICKS**, that part of opticks that treat of reflex vision.

**CATROPTICK CISTULA**, the name of an optical machine or apparatus, whereby bodies are represented extremely large, &c. The machine consists of several mirrors properly disposed in a concavity of a kind of chest.

**CATOPTRICK TELESCOPE**, another name for the reflecting telescope.

**CATTLE**, a general name for beasts of pasture, that are neither wild nor domestick; but generally confined to those of the ox kind.

Cattle are known to be very advantageous to the breeders of them; and therefore those in middling fortune would do well to apply some part of their time and farms to this useful work: but people in these circumstances, finding it impracticable to make large profits, too often reject, with disdain, the small advantages continually in their power. In vain the wise man informs them, that whoever neglects small profits will daily decay; in vain reason dictates, that from a small stock they must be contented with small gain; but that a great number of small profits, which it is easy to multiply by labour, becomes in a short time an object of consideration.

It must not however be imagined, that in order to derive a considerable advantage from cattle, it will be sufficient to have a great number, and to give them the necessary fodder: there are many other circumstances to be attended to, without which it would be in vain to flatter ourselves with the expectation of riches. They are often kept in too narrow a cow-house, from whence many inconveniences arise. Sometimes they fight, and wound one another. The most voracious starve their neighbours, from whom they carry off all the fodder within their reach; and the injured cows decay insensibly, become languid, or give little milk. In summer the heat incommodes them, a circumstance which makes them grow lean, and diminishes the quantity of their milk. Care must therefore be taken that they have sufficient room in their stalls; that they be cool in summer, and warm in winter. At all seasons let them be dry, for that is a material point. Even in summer, humidity is disagreeable to them, and in winter it chills them. To prevent this double inconvenience, it will be proper to pave the cow-houses on a gentle descent, and to dig a pit to collect all water and stale. By this means the cattle will lie always dry, and the stale be collected for good purposes. Horned cattle sometimes contract a habit of licking one another; and that injures so much, that a butcher who perceives it, will give less money for them than for others. They are cured of this habit, by rubbing the places they have licked with cow-dung, the bitterness of which prevents them from pursuing it.

We shall insist on the advantages attending the breeding of young cattle, whatever trouble it may cost; because there is no prudent countryman who is not fully persuaded they are real. To buy what he may have of his own growth is to a farmer no acquisition, but a dis-

sipation; because the land produces no money, which is only to be obtained by the sale of commodities, and very often the purchase of some goods destroys all the profit resulting from the sale of others. It ought, therefore, to be an inviolable maxim, especially with those in narrow circumstances, to spare no pains in improving their stock, not making small estimation of what has cost them no money, but frugal as if they had bought it. By this means, if we except unforeseen accidents, which can never be prevented, they will find wealth flow in upon them annually, though slowly, and lay the foundation of a solid fortune.

**CAVA**, or **VENA CAVA**, in anatomy, a vein arising with a large sinus from the right auricle of the heart. See the article **VEIN**.

**CAVALCADE**, a pompous procession of horsemen, equipages, &c. by way of parade to grace a triumph, publick entry, or the like.

**CAVALIER**, in fortification, a heap or mass of earth, raised in a fortress, having a platform on the top, bordered with a parapet to cover the cannon, and cut with embrasures.

**CAVALRY**, a body of soldiers that fight on horseback.

**CAVASION**, or **CAVAZION**, in architecture, implies the trench dug for laying the foundation of a building.

**CAUDA**, in a general sense denotes the tail of an animal.

**CAUDA Ceti**, in astronomy, a fixed star of the second magnitude in the tail of the whale, called by the Arabians *dineb kaktos*.

**CAUDA Cygni**, a fixed star of the second magnitude in the tail of the swan.

**CAUDA Delphinis**, a fixed star of the third magnitude in the tail of the dolphin.

**CAUDA Draconis**, the dragon's tail, the descending node of the moon. See **NODES**.

**CAUDA Leonis**, a fixed star of the first magnitude in the tail of the lion.

**CAVE**, a subterraneous hollow place of a certain extent.

Some authors distinguish between a cave and a cavern, making the first the effect of art, and the latter of nature.

The caves in Wiltshire, between Luckington and Great-Badmington, are nine in number, of a row, of several dimensions, the least four feet broad, and nine or ten feet long, are credibly supposed to be the tombs of some heroick men among the ancient Romans, Saxons, and Danes, because spurs, and pieces of armour have been dug out of them.

**CAVEAR**, or **CAVEER**, the spawn or hard roes of sturgeon, salted and dried in the sun.

**CAVEAT**, in law, implies a kind of process in the ecclesiastical courts, to stop the proving of a will, granting letters of administration, &c. to the prejudice of another.

**CAVEATING**, in fencing, implies a motion whereby a person in an instant brings his sword, which was presented to one side of his adversary, to the opposite side.

**CAVERNOSE**, full of cells, an appellation given by anatomists to several parts of the body on account of its spongy structure.

**CAVETTO**, in architecture, the name of an ornament frequently used in cornices, it is a concave moulding containing a quarter of a circle, being equal to half a scotia.

**CAVEZON**, in the menage, a sort of noseband, either of iron, leather or wood, placed in such a manner as to wring the nose of a horse, in order to render him more subject to command, and facilitate his breaking.

**CAVIN**, in military affairs, implies a natural hollow, sufficiently capacious to lodge a body of troops.

**CAUK**, or **CAWK**, among the miners in the peak of Derbyshire, denotes a coarse sort of spar. It is a ponderous white stone frequently found in the lead mines, and will draw a white line like chalk, on the galactiles.

**CAUL**,



CAUL, *Omentum*, in anatomy. See OMENTUM.

CAUL is also the name of a small thin membrane, encompassing the head of some children, at their birth.

CAULICOLES, in architecture, imply the eight small stalks, or branches, arising from the four primary branches, or cauls, supporting the eight volutes in the Corinthian capital.

CAULIFEROUS, an epithet applied by botanists to such plants as have a perfect caulis or stalk.

CAULIFLOWERS, in gardening, a much esteemed species of cabbage.

Cauliflowers have of late years been so much improved in Britain, as to exceed in goodness and magnitude any produced in most parts of Europe: and, by the skill of the gardener, are continued for several months together; but the most common season for them is in May, June and July.

CAULINE LEAF, among botanists, implies a leaf growing from the stalk of a plant.

CAULIS, in botany, the stalk of an herbaceous plant.

CAULKING, among shipwrights, implies the driving oakum, into the seams of the planks, in order to prevent the water from entering.

CASUALTY, among philosophers, implies the action or power of a cause in producing its effect.

CASUALTY, among miners, signifies the lighter or more sulphureous part of the ore separated from it by washing.

CAUSE, *Causa*, that from which any thing proceeds, or by which any thing is done. Thus we perceive that lead is easily rendered fluid by heat; we therefore consider heat as the cause, and fluidity as the effect.

*First* CAUSE, that which acts of itself; and consequently can be no other than the Divine Being.

*Second* CAUSE, that which produces some effect by virtue of a power it received from the first cause. Thus gravity, which owes its existence to the first cause, is the power which makes heavy bodies tend towards the centre of the earth.

CAUSE in law, is the same with action.

CAUSEWAY, or CAUSEY, an elevated road, or mound for confining the waters of a pond, river, &c.

CAUSTICKS, in physick, an appellation given to medicines, of so hot and fiery a nature, that being applied, consume, and, as it were, burn the texture of the parts like hot iron.

Causticks differ from cauteries, in that they perform their effects slower, and with less force and pain: they are used to eat off proud fungous flesh; they also penetrate within hard callous bodies, and liquify the humours; and are particularly applied in abscesses and imposthumations, to eat through to the suppurated matter, and give it vent; sometimes also to make issues, in parts where cutting is difficult or inconvenient.

Causticks are generally divided into four sorts, the common stronger caustick, the common milder caustick, the antimonial caustick, and the lunar caustick.

The stronger caustick is prepared, by boiling to a fourth part any quantity of the lees of almond-soap, adding lime, that has been kept in a vessel pretty close stopt for several months; the lime is to be added till the liquor is absorbed, and the whole reduced to a paste, which is to be kept in a vessel well stopt.

The common milder caustick is prepared, by taking equal parts of soft soap, and fresh quick-lime, and mixing them at the time of using.

The antimonial caustick is prepared thus: take of antimony one pound, of corrosive sublimate, two pounds; and being reduced separately into powder, mix them well, and distil them in a retort with a wide neck, in a gentle heat of sand; let what ascends into the neck of the retort be exposed to the air, that it may run into a liquor.

The method of preparing the lunar caustick is as follows: dissolve pure silver by a sand-heat, in about twice its weight of aquafortis; then dry away the humidity with a gentle fire; afterwards melt it in a crucible, that it may be poured into proper moulds, carefully avoiding over much heat, lest the matter should grow too thick.

CAUSTICK-CURVE, in the higher geometry signifies a curve formed by the coincidence of the rays of light reflected from some other curve.

CAUSTICK-GLASSES, the same with burning-glasses. See the article *Burning-GLASS*.

CAUTERIZATION, the application of cauteries to any part of the body.

CAUTERY, among surgeons, implies a medicine capable of burning, eating or corroding any of the solid parts of the body.

Cauteries are of two kinds, actual and potential. The actual cauteries are red-hot instruments, generally of iron, which are often applied to many parts of the body. Potential cauteries are corroding medicines, the principal of which we have described under the article caustick. See CAUSTICK.

CAUTING-IRON, among farriers, an iron with which they sear or cauterize those parts of an animal that require burning.

CAZEMATE. See CASEMATE.

CEDAR, *Cedrus*, in botany, a distinct genus of trees, according to Tournefort, but considered only as a species of the juniper by Linnæus.

The cedar is a large-spreading tree, and grew formerly plentifully on Mount Lebanon; but there are very few of them there at present. The wood, which has a fine grain and fragrant smell, is almost incorruptible, on account of its bitterness, which renders it offensive to worms. Historians tell us, that some of this timber was found in the temple of Apollo at Utica, above two thousand years old.

During the hottest season of the year, there runs naturally, and without any incision, from the trunk and large branches of this tree, a white, clear, and transparent resin, which is called cedar-gum, or mastacine-manna, which hardens and forms itself into grains like mastick. The largest trees hardly yield six ounces of it a day.

When the gum has done running of itself, they make incisions into the tree, from whence issues afterwards an unctuous liquor, which dries as it runs along the trunk of the tree. This is the resin of cedar, which is sold at the druggists shops. It is of a fine yellow colour, friable, lucid, transparent, and of a good smell.

Lastly, the cedar furnishes also a third sort of drug, called turpentine, or resin of cedar; it is a clear liquor, like water; of a strong penetrating scent, contained in small bladders or vesicles, which the excessive heat of the sun causes to rise on the trunk of the tree.

CEILING, in architecture, the upper part of a room, generally formed of plaister of stucco, and often decorated in a very beautiful manner.

CELANDINE *the Greater*, *Chelidonium*, in botany, a plant with fibrous hairy roots. The leaves are of a bright green colour on the upper side, and bluish underneath; these are longish and divided to the rib into roundish indented portions, of which those at the extremities are much larger than the others; these leaves contain a bright yellow juice, as does likewise the stalks, which are knotty, fistulous, brittle, and branched, with leaves alternately placed. The flowers are yellow and tetrapetalous, coming out in clusters. The filaments are plain and numerous, topped by oblong, compressed, twin antheræ; and the fruit is a cylindraceous pod of one or two valves, containing a number of ovated, shining, black seeds. This plant flowers in May, and grows naturally in many parts of England; it is by all allowed to abound with a sharp acrid salt, and is therefore recommended as a powerful aperient and attenuant: it is judged to be a specific against the jaundice, scurvy, and all obstructions and disorders of the viscera.

Half a dram, or a dram of the dried root in powder, or an infusion in wine or water of a dram, or a dram and a half of the fresh root, or three or four drops of its saffron-coloured juice, in any convenient vehicle, are directed for a dose; but great caution is requisite in the internal use of a medicine so acrimonious and irritating.

Among us it is chiefly used by common people for some external purposes, as the destroying warts, cleansing



ing foul fores, and removing clouds, films, and specks from the eye. For this last intention the juice should be largely diluted in milk, it being of itself much too sharp to be applied with safety to so tender an organ.

**CELANDINE** the *Lesser*, or pilewort, in botany, a small plant with roundish, smooth, shining, green leaves, set in long pedicles, and slender procumbent stalks, bearing bright gold-coloured flowers. The root consists of slender fibres, with a number of tubercles, or little knobs among them. It is perennial, flowers in April, and grows wild in hedges and moist meadows. The leaves of this plant are reckoned antiscorbutick, and the roots are by some said to be a specifick against the piles, but with very little foundation.

**CELARENT**, in logick, a mode of syllogism, wherein the major and conclusion are universal negative propositions, and the minor an universal affirmative.

**CELERIACK**, in botany, a species of the apium. It differs from the common celery, by having a turnip-shaped root, which is the part used in cookery: also it is distinguished by the colour of the stalks, which are brown; whereas those of common celery are green when not blanched.

**CELERY**, *Apium*, in botany, a well-known plant, much used in soups, and for other culinary purposes, propagated by seeds, which should be sown at two or three different times. The first sowing may be in March, on a gentle hot bed, the next in April, and the last sowing in May. When the plants of the first sowing are of sufficient size to prick out, some beds of rich earth should be prepared to receive them. Here they may continue until May or June, when they may be transplanted into trenches, (well prepared with rotten dung) where they are to perfect themselves for use; these trenches should be made about three feet asunder, and as the plants advance in height, the earth should be carefully laid up against them at different times, in dry weather, in order to whiten and make them more tender, observing not to cover their hearts. Those of latter sowing are to be managed in the same manner, allowing for the different time.

**CELERITY**, in mechanicks, the swiftness of any body in motion.

**CELESTINS**, in ecclesiastical history, a religious order, reformed from Bernardins by pope Celestin the fifth.

**CELIBACY**, the state of an unmarried person, a state in which the clergy of the church of Rome are obliged to continue.

**CELIDOGRAPHY**, a description of the spots visible on the disks of the sun or planets.

**CELL**, a small division in a honey-comb, or in the pods, husks, and other seed-vessels of plants.

**CEMENT**, or **CÆMENT**. See **CÆMENT**.

**CEMENTATION**. See **CÆMETATION**.

**CEMENTATORY WATER**, in natural history, implies water so strongly impregnated with vitriol of copper, as to dissolve iron immersed in it, and precipitate an equal quantity of copper in its stead. There are several of these springs found in copper-mines, particularly near Neuvol, at the foot of the Krapack mountains in Hungary.

**CENOTAPH**, an empty tomb, or a monument erected to the honour of a person, without the body of the deceased being interred in or near it.

**CENSER**, a sacred utensil, made use of in the religious rites of the ancients, Jews as well as Pagans. It is also still used in the Romish church.

**CENSOR**, among the ancient Romans, was a magistrate whose business it was to reform the manners, and set a value on the estates of the people.

**CENSUS**, in Roman antiquity, an authentick declaration, made by the several subjects of the empire, of their respective names and places of abode before the censors, by whom all these declarations were registered.

**CENT**, an abridgment of the word centum, a hundred, frequently used in commercial affairs to imply the gain or loss upon every hundred pounds laid out. Thus to gain ten per cent. is to gain ten pounds for every hundred pounds expended.

VOL. I. No. 17.

**CENTAUR**, among the ancient poets, signified a fabulous kind of animal, half a man and half a horse.

The centaurs were nothing more than a tribe of Lapithæ, who inhabited the city of Pelethronium, adjoining to mount Pelion, and first invented the art of breaking horses.

**CENTAUR**, or **CENTAURUS**, in astronomy, a constellation of the southern hemisphere generally joined with the wolf, centaurus cum lupo. The stars in this constellation in Ptolemy's catalogue are nineteen, in Tycho's four, and in the Britannick catalogue thirteen.

**CENTAURIUM** *Majus*, and *Minus*, in the materia medica, two plants, described under the common name centaurium; but extremely distinct from one another, and indeed belong to two different classes.

The greater centaury, however, is at present wholly rejected from our shops, and the small one centaurium minus alone retained there.

This is one of the pentandria monogynia of Linnaeus, and of the herbæ pentapetaloides vasculiferæ of Ray. It is described by J. Bauhine under the name of centaurium minus flore purpureo, and by most of the other botanical writers under that of centaurium minus alone. It grows to six or eight inches high, its stalk is tough and woody, and branched toward the top: there is a cluster of leaves about its base, and others standing in pairs higher upon it. They are of an oblong figure, smooth, not serrated at the edges, and of a pale green colour; the flowers stand in little clusters towards the tops of the branches; they are moderately large, and of a beautiful bright red colour; they are tubular and divided into five segments at the edge. The flowers are succeeded by long and slender membranaceous capsules, which contain small seeds in great numbers lodged in their cells. The flowers and leaves of this plant are intensely bitter; the root, which is small, whitish, and woody, has scarce any taste.

The flowery tops of small centaury are the part to be used in medicine; they are attenuating and resolvent, and are good against all collections of viscid humours, and obstructions of the viscera. It restores a decayed appetite, and promotes digestion, it is good in all chronick cases, and will often cure intermittent fevers without any further assistance. It promotes urine and the menses, and is remarkable for opening the hæmorrhoidal veins, and forcing the accustomed discharges that way, when they have been by any accident suppressed and impeded. The tops are best infused in wine for these purposes, and a moderate glass drank by way of a dose twice a day. Rulandus affirms, that all intermittent fevers may be cured by this plant, after a vomit has been given; but this is saying too much. We are to observe, however, that persons cured by medicines of this kind, which attack the very essential cause of the disease, are less subject to relapses than those cured by any other means.

**CENTIPES**, in zoology, the same with the scolopendra. See the article **SCOLOPENDRA**.

**CENTNER**, among metallurgists and assayers, denotes a weight divisible first into an hundred, and afterwards into other lesser parts.

**CENTO**, in poetry, a work wholly composed of verses or passages, promiscuously taken from other authors, only disposed in a new form and order.

**CENTRAL**, something relating to a centre.

**CENTRAL FORCES**, the powers which cause a moving body to tend towards, or recede from the centre of motion.

If a body A (*plate XVI. fig. 5.*) be suspended at the end of a string AC, moveable about a point C, as a centre, and in that position receives an impulse in an horizontal direction, it will be thereby compelled to describe a circle about the central point. While its circular motion continues, the body will certainly endeavour to recede from the centre, which is called the centrifugal force, and arises from the horizontal impetus. With this force it acts upon the fixed centre-pin, and that, by its immobility, re-acts with an equal force on the body, by means of the string, and solicits it toward the centre of motion: whence it is called the centripetal



petal force; and when we speak of either or both indefinitely, they are called the central forces of the revolving body.

The theory of this species of motion is comprised in the following propositions.

1. When two or more bodies revolve at equal distances from the centre of the circle they describe, but with unequal velocities, the central forces, necessary to retain them, will be to each other as the squares of their velocities. That is, if one revolves twice as fast as the other, it will require four times the retaining force the other does; if with three times the velocity, it will require nine times the force to retain it in its orb, &c.

2. When two or more bodies move with equal velocities, but at unequal distances from the centre they revolve about, their central forces must be inversely as their distances. That is, by how many times greater the distance a body revolves at, is from the centre, so many times less force will retain it.

3. When two or more bodies perform their revolutions in equal times, but at different distances from the centre they revolve about, the forces requisite to retain them in their orbs, will be to each other as the distance they revolve at from the centre: for instance, if one revolves at twice the distance the other does, it will require a double force to retain it, &c.

4. When two or more bodies revolving at different distances from the centre, are retained by equal centripetal forces, their velocities will be such, that their periodical times will be to each other, as the square roots of their distances. That is, if one revolves at four times the distance another does, it will perform a revolution in twice the time that the other does; if at nine times the distance, it will revolve in thrice the time.

5. And, in general, whatever be the distances, the velocities, or the periodical times of the revolving bodies, the retaining forces will be to each other in a ratio compounded of their distances directly, and the squares of their periodical times inversely. Thus, for instance, if one revolves at twice the distance another does, and is three times as long in moving round, it will require two-ninths, that is, two-ninths of the retaining power the other does.

6. If several bodies revolve at different distances from one common centre, and the retaining power lodged in that centre decrease as the squares of the distances increase, the squares of the periodical times of these bodies will be to each other as the cubes of their distances from the common centre. That is, if there be two bodies whose distances, when cubed, are double or treble, &c. of each other, then the periodical times will be such, as that when squared only, they shall also be double or treble, &c.

7. If a body be turned out of its rectilinear course, by virtue of a central force, which decreases as you go from the seat thereof, as the squares of the distances increase; that is, which is inversely as the square of the distance, the figure that body shall describe, if not a circle, will be a parabola, an ellipsis, or an hyperbola; and one of the foci of the figure, will be at the seat of the retaining power. That is, if there be not that exact adjustment between the projectile force of the body and the central power necessary to cause it to describe a circle, it will then describe one of those other figures, one of whose foci will be where the seat of the retaining power is.

8. If the force of the central power decrease as the square of the distance increases, and several bodies revolving about the same describe orbits that are elliptical, the squares of the periodical times of these bodies will be to each other, as the cubes of their middle distances from the seat of that power.

9. If the retaining power decrease something faster as you go from the seat thereof (or which is the same thing, increase something faster as you come towards it) than in the proportion mentioned in the last proposition, and the orbit the revolving body describes be not a circle, the axis of that figure will turn the same way the body revolves: but if the said power decrease (or increase) somewhat slower than in that proportion, the axis of the figure will turn the contrary way. Thus, if a re-

volving body, as D (*plate XVI. fig. 6.*) passing from A towards B describe the figure ADB, whose axis AB, at first points towards M and N, and the power whereby it is retained decrease faster than the square of the distance increases, after a number of revolutions, the axis of the figure will point towards P, and after that towards R, &c. revolving round the same way with the body; and if the retaining power decrease slower than in that proportion, the axis will turn the other way.

Thus it is the heavenly bodies, viz. the planets, both primary and secondary, and also the comets, perform their respective revolutions. The figures in which the primary planets and the comets revolve, are ellipses, one of whose foci is at the sun: the areas they describe, by lines drawn to the centre of the sun, are in each proportional to the times in which they are described. The squares of their periodical times, are as the cubes of their middle distances from the sun. The secondary planets describe also circles or ellipses, one of whose foci is in the centre of their primary ones, &c.

**CENTRAL RULE**, a rule discovered by Mr. Thomas Baker, whereby to find the centre of a circle designed to cut the parabola in as many points, as an equation to be constructed hath real roots. Its principal use is in the construction of equations, and he has applied it with good success as far as biquadratics.

**CENTRE**, in a general sense, signifies a point equally distant from the extremities of a line, surface, or solid.

**CENTRE of Attraction**, in the new astronomy, is that point towards which the revolving planet or comet is impelled or attracted, by the impulse of gravity.

**CENTRE of a Bastion**, is a point in the middle of the gorge of a bastion, from whence the capital line commences, and which is generally at the inner polygon of a figure.

**CENTRE of a Battalion**, is the middle of a battalion, where there is generally left a square place, for holding the cloaths and baggage.

**CENTRE of a Circle**, is a point within the same, from whence all lines drawn to the circumference are equal.

**CENTRE of a Conick Section**, is the point where all the diameters meet.

**CENTRE of a Dial**, is that point where a line drawn parallel to the axis of the earth intersects the dial planes.

**CENTRE of an Ellipsis**, is that point where the transverse and conjugate diameters intersect each other.

**CENTRE of the Equant**, in the old astronomy, is a point in the line of the aphelion, being as far distant from the eccentric towards the aphelion, as the sun is from the eccentric towards the perihelion.

**CENTRE of Gravity**, in mechanics, that point about which all the parts of a body do, in any situation, exactly balance each other. Hence, 1. If a body be suspended by this point as the centre of motion, it will remain at rest in any position indifferently. 2. If a body be suspended in any other point, it can rest only in two positions, viz. when the said centre of gravity is exactly above or below the point of suspension. 3. When the centre of gravity is supported, the whole body is kept from falling. 4. Because this point has a constant endeavour to descend to the centre of the earth, therefore, 5. When the point is at liberty to descend, the whole body must also descend, either by sliding, rolling, or tumbling down. 6. The centre of gravity in regular uniform and homogeneous bodies, as squares, circles, &c. is the middle point in a line connecting any two opposite points or angles. Wherefore, if such a line be bisected, the point of section will be the centre of gravity.

To find the centre of gravity of a triangle, let BG (*plate XVI. fig. 8.*) bisect the base AC of the triangle ABC, it will also bisect every other line DE drawn parallel to the base, consequently the centre of gravity of the triangle will be found somewhere in the line BG. The area of the triangle may be considered as consisting of an infinite number of indefinitely small parallelograms, DEba, each of which is to be considered as a weight, and also as the fluxion of the area of



of the triangle, and so may be expressed by  $2 y \dot{x}$ , (putting  $BF = x$ , and  $FE = y$ ) if this fluxionary weight be multiplied by its velocity  $x$ , we shall have  $2 y x \dot{x}$  for its momentum. Now put  $BG = a$  and  $AC = b$ , then  $BG$

$(a) : AC(b) :: BF(x) : DE = \frac{bx}{a} = 2y$ , therefore the flu-

xion of the weights  $2 y \dot{x} = \frac{b x \dot{x}}{a}$ ; and the fluxion of the momenta  $2 y x \dot{x} = \frac{b x x \dot{x}}{a}$ , whence the fluent of the lat-

ter, viz.  $\frac{b x^3}{3a}$  divided by the fluent of the former, viz.  $\frac{b x^2}{2a}$  will give  $\frac{2}{3}x$  for the distance of the point from B

in the line  $BF$ , which has a velocity equal to the mean velocity of all the particles in the triangle  $DBE$ , and is therefore its centre of gravity. Consequently the centre of gravity of any triangle  $ABC$ , is distant from the vertex  $B$   $\frac{2}{3}BG$  a right line drawn from the angle  $B$  bisecting the base  $AC$ . And since the section of a superficial or hollow cone is a triangle, and circles have the same ratio as their diameters, it follows that the circle whose plane passes through the centre of gravity of the cone, is  $\frac{2}{3}$  of the length of the side distant from the vertex of the said cone.

To find the centre of gravity of a solid cone. As the cone consists of an infinite number of circular areas, which may be considered as so many weights, the centre of gravity may be found as before, by putting  $BE = x$  (plate XVI. fig. 9.)  $BG = a$ , the circular area  $DFE = y$ , and  $AGC = b$ ; and from the nature of the cone,

$a^2 : x^2 :: b : y = \frac{bx^2}{a^2}$ ; but  $\dot{y} = \frac{bx^2 \dot{x}}{a^2} =$  fluxion of the

weights; and  $y x \dot{x} = \frac{bx^3 \dot{x}}{a^2} =$  fluxion of the momenta,

whence the fluent of the latter, viz.  $\frac{bx^4}{4a^2}$  divided by the

fluent of the former  $\frac{bx^3}{3a^2}$  will give  $\frac{3}{4}x$  for the centre of

gravity of the part  $DBEF$ , consequently the centre of gravity of the cone  $ABCG$  is distant from the vertex  $B$   $\frac{3}{4}$  of the side  $BG$ , in a circle parallel to the base.

To find the centre of gravity in a parallelogram and parallelopiped, draw the diagonal  $AD$  and  $EG$  (plate XVI. fig. 10.) likewise  $CB$  and  $HF$ ; since each diagonal  $AD$  and  $CB$  divides the parallelogram  $ACDB$  into two equal parts, each passes through the centre of gravity, consequently the point of intersection  $I$  must be the centre of gravity of the parallelogram. In like manner, since both the plane  $CBFH$  and  $ADGE$  divide the parallelopiped into two equal parts, each passes through its centre of gravity, so that the common intersection  $IK$  is the diameter of gravity, the middle whereof is the centre. After the same manner may the centre of gravity be found in prisms and cylinders, it being the middle point of the right line that joins the centre of gravity of their opposite bases.

The centre of gravity of a parabola, is found as in the triangle and cone. Thus, let  $BF$  in the parabola  $ABC$  (plate XVI. fig. 11.) be equal to  $x$ ,  $DE = y$ , then will  $y x$  be the fluxionary weight, and  $y x \dot{x}$  the fluxion of the momenta; but from the nature of the curve, we have  $y = x^{\frac{1}{2}}$ ; whence  $y \dot{x} = \frac{1}{2}x^{-\frac{1}{2}}$ , and  $y x \dot{x} = x^{\frac{1}{2}} \dot{x}$ , whose fluent  $\frac{2}{3}x^{\frac{3}{2}}$  divided by  $\frac{2}{3}x^{\frac{3}{2}}$  the fluent of  $x^{\frac{1}{2}} \dot{x}$  will give  $\frac{3}{5}x = \frac{3}{5}BF$  for the distance of the centre of gravity from the vertex  $B$  in the part  $DBE$ ; and so  $\frac{2}{5}$  of  $BG$  is that centre in the axis of the whole parabola  $ABC$  from the vertex  $B$ .

The centre of gravity in the human body, is situated in that part which is called the pelvis, or in the middle between the hips.

*Common CENTRE of gravity of two or more bodies*, a point so situated in a right line joining the centres of these bodies, that if this point be suspended, the bodies will equiponderate, and rest in any situation. In two equal bodies, it is at equal distances from both: when the bodies are unequal, it is nearer to the greater body,

in proportion as it is greater than the other; or the distances from the centres are inversely as the bodies. Let  $A$  (plate XVI. fig. 7.) be greater than  $B$ , join  $AB$ , upon which take the point  $C$ , so that  $CA : CB :: B : A$ , or that  $A \times CA = B \times CB$ , then is  $C$  the centre of gravity of the bodies  $A$  and  $B$ . If the centre of gravity of three bodies be required, first find  $C$  the centre of gravity of  $A$  and  $B$ ; and supposing a body to be placed there equal to the sum of  $A$  and  $B$ , find  $G$  the centre of gravity of it and  $D$ ; then shall  $G$  be the centre of gravity of the three bodies  $A$ ,  $B$  and  $D$ . In like manner the centre of gravity of any number of bodies is determined.

The sum of the products that arise by multiplying the bodies by their respective distances, from a right line or plane given in position, is equal to the product of the sum of the bodies multiplied by the distance of the centre of gravity from the same right line or plane, when all the bodies are on the same side of it: but when some of them are on the opposite side, their products, when multiplied by their respective distances from it, are to be considered as negative, or to be subtracted. Let  $IL$  (plate XVI. fig. 14.) be the right line given in position,  $C$  the centre of gravity of the bodies  $A$  and  $B$ ;  $Aa$ ,  $Bb$ ,  $Cc$ , perpendiculars to  $IL$  in the points  $a$ ,  $b$ , and  $c$ ; then if the bodies  $A$  and  $B$  be on the same side of  $IL$ , we shall find  $A \times Aa + B \times Bb = A + B \times Cc$ . For drawing through  $C$ , the right line  $MN$  parallel to  $IL$  meeting  $Aa$  in  $M$ , and  $Bb$  in  $N$ , we have  $A : B :: BC : AC$  by the property of the centre of gravity, and consequently  $A : B :: BN : AM$ , or  $A \times AM = B \times BN$ ; but  $A \times Aa + B \times Bb = A \times Cc + A \times AM + B \times Cc - B \times BN = A \times Cc + B \times Cc = A + B \times Cc$ . When  $B$  is on the other side of the right line  $IL$  (plate XVI. fig. 13.) and  $C$  on the same side with  $A$ , then  $A \times Aa - B \times Bb = A \times Cc + A \times AM - B \times BN + B \times Cc = A + B \times Cc$ : and when the sum of the products of the bodies on one side of  $IL$  multiplied by their distances from it, is equal to the sum of the products of the bodies multiplied by their distances on the other side of  $IL$ , then  $Cc$  vanishes, or the common centre of gravity of all the bodies falls on the right line  $IL$ . Hence it is demonstrable, that when any number of bodies move in right lines with uniform motions, their common centre of gravity moves likewise in a right line with an uniform motion; and that the sum of their motions esteemed in any given direction, is precisely the same as if all the bodies in one mass were carried on with the direction and motion of their common centre of gravity.

*CENTRE of Magnitude*, is that point which is equally distant from all the external parts of the body.

*CENTRE of Motion*, is that point which remains at rest while all the other parts of the body move about it.

*CENTRE of Oscillation*, is that point in which, if the whole gravity of a pendulum was collected, the time of its vibration would not be altered thereby.

This is the point from whence the length of the pendulum is measured, which in our latitude, in a pendulum that swings seconds, is 39 inches and two tenths.

If the ball  $AB$  (plate XVI. fig. 2.) be hung by the string  $CD$ , whose weight is inconsiderable, the centre of oscillation is found thus. Suppose  $E$  the centre of the globe; take the line  $K$  of such a length that it may bear the same proportion to  $ED$ , as  $ED$  does to  $EC$ ; then,  $EH$  being made equal to  $\frac{2}{3}$  of  $K$ , the point  $H$  shall be the centre of oscillation.

But if the weight of the rod be too considerable to be neglected, divide  $CD$  (fig. 1.) in  $I$ , so that  $DI$  may be equal to  $\frac{1}{2}$  of  $CD$ , and make a line, as  $G$ , in the same proportion to  $CI$ , that the weight of the rod bears to that of the globe: then having found  $H$ , the centre of oscillation of the globe, as before, divide  $IH$  in  $L$ , so that  $IL$  may bear the same proportion to  $LH$  as the line  $CH$  bears to the line  $G$ , then will  $L$  be the centre of oscillation of the whole pendulum.

*CENTRE of percussion*, is that point in which the force of the stroke is the greatest possible.

When the moving body revolves round a fixed point, the centre of percussion is the same with the



centre of oscillation, and found by the same method.

But when the body moves in a parallel direction, the centre of percussion is the same with the centre of gravity.

**CENTRE of a sphere**, a point in the middle, from which all lines drawn to the surface are equal.

**CENTRIFUGAL FORCE**, that force by which all bodies that move round any other body in a curve endeavour to fly off from the axis of their motion in a tangent to the periphery of the curve, and that in every point of it.

Mr. Huygens demonstrates, that this force is always proportional to the circumference of the curve in which the revolving body is carried round. The centrifugal force of any body is to the centripetal, as the square of the arch which a body describes in a given time, divided by the diameter, to the space through which a heavy body moves in falling from a place where it was at rest in the same time.

If any body swim in a medium heavier than itself, the centrifugal force is the difference between the specific weight of the medium, and the floating body.

All moving bodies endeavour after a rectilinear motion, because it is the easiest, shortest, and most simple: whenever therefore they move in any curve, there must be something that draws them from their rectilinear motion, and detains them in their orbits; and were that force to cease, the moving body would go straight off in a tangent to the curve in that very point, and so would get still further and further from the focus, or centre of its curvilinear motion.

It may be, that in a curve where the force of gravity in the describing body is continually variable, the centrifugal force may also continually vary in the same manner, and so that one may also supply the defect, or abate for the excess of the other, and consequently the effect be every where equal to the absolute gravity of the revolving body.

**CENTRIFUGAL MACHINE**, the name of an hydraulic instrument for raising water by means of a centrifugal force, combined with the pressure of the atmosphere.

This machine, which was invented by the ingenious Mr. Erskine, promised at first to be of great advantage in raising water, but by repeated experiments, has been found liable to more objections than the common pump, and accordingly laid aside.

**CENTRIPETAL FORCE**, that force by which a body is every where impelled, or any how tends towards some point as a centre; such is gravity, or that force whereby bodies tend towards the centre of the earth; magnetical attraction, whereby the load-stone draws iron; and that force, whatever it be, whereby the planets are continually drawn back from right-lined motions, and made to move in curves.

The greater the quantity of matter in any body is, the greater will be its centripetal force, all things else alike. If a body laid upon a plane, revolve at the same time, and about the same centre with that plane, and so described a circle; and if the centripetal force, where-with the body is drawn every moment towards the centre, should cease to act, and the plane should continue to move with the same velocity, the body will begin to recede from the centre about which the plane moved. See the article **CENTRAL FORCES**.

**CENTRO-BARYCK METHOD**, in mechanicks, the method of determining the content of a superficies, or solid, by means of the centre of gravity.

**CENTRUM**, in geometry and mechanicks, the same with centre. See the article **CENTRE**.

**CENTRUM PHONICUM**, the place where the speaker stands in articulate echos. See the article **ECHO**.

**CENTRUM PHONO-CAMPTICUM**, the object or spot that returns the echo. See the article **ECHO**.

**CENTRUM TENDINOSUM**, in anatomy, the point where the muscles of the diaphragm meet.

**CENTRY-BOX**, a sort of wooden box or hut, to shelter the centry or centinel from the injuries of the weather.

**CENTURION**, among the ancient Romans, was

an officer in the infantry, who commanded a century or hundred men.

**CENTURY**, an hundred years, or any other thing divided into a hundred years.

**CEPA**, in botany, the onion. See **ONION**.

**CEPHALICK**, something belonging to the head, or its parts.

**CEPHALICK MEDICINES**, remedies for disorders of the head.

**CEPHALICK VEIN**, in anatomy, creeps along the arm, between the skin and the muscles, and divides it into two branches; the external goes down to the wrist, where it joins the basilica, and turns up to the back of the hand: the internal branch, together with a small one of the basilica, makes the mediana.

**CEPHALOPHARYNGÆI**, in anatomy, the first pair of muscles of the upper part of the gullet, which proceed from beside the head and neck, and are spread more largely upon the tunick of the gullet. See the article **MUSCLES of the Human Body**.

**CEPHEUS**, in astronomy, a constellation of the northern hemisphere, whose stars, in Ptolemy's catalogue, are thirteen; in Tycho's, eleven; in Hevelius's, forty; and in Mr. Flamsteed's, thirty-five.

**CERASTES**, the horned snake; a species of serpent whose bite is fatal. It has its name from a protuberance and its head as hard as a shell.

**CERASUS**, the cherry-tree. See **CHERRY-TREE**.

**CERATE**, in pharmacy, a general name for topical medicines that are softer than a plaister, and harder than an ointment.

**CERATOGLOSSUM**, in anatomy, a pair of muscles whose principal use is to draw the tongue directly into the mouth.

**CERATONIA**, the carob-tree, in botany, a genus of plants ranged by Linnæus among the dioecia-pentandria, and of which there is only one species.

This tree is very common in Spain, and in some parts of Italy, as also in the Levant, where it grows in the hedges, and produces a great quantity of long flat brown-coloured pods, which are thick, mealy, and of a sweetish taste. These pods are many times eaten by the poorer sort of inhabitants, when they have a scarcity of other food; but they are apt to loosen the belly, and cause gripings of the bowels.

**CERCIS**, the Judas-tree, in botany, a plant which grows naturally in the south of France. In Spain and Italy it rises with an upright trunk to the height of twelve or fourteen feet, covered with a dark reddish bark, and divides upwards into many irregular branches, which are furnished with round, heart-shaped smooth leaves, placed irregularly on the branches, with long foot-stalks. The wood of this tree is very beautifully veined with black and green; it takes a fine polish, and may be converted into many uses.

There is another species of cercis, which is a native of North-America, where it is called the red-bud-tree.

**CERBERUS**, the name of a dog, with three heads, whom the poets made to be the porter of the infernal regions.

**CERDONIANS**, in church history, ancient heretics, who maintained most of the errors of Simon Magus, Saturnel, and other Gnosticks.

**CEREALIA**, in antiquity, the sacred rites of the goddess Ceres, instituted by Triptolemus.

**CEREBELLUM**, in anatomy, the hinder part of the brain. See the article **BRAIN**.

**CEREBRUM**, in anatomy, denotes the brain. See the article **BRAIN**.

**CEREMONIAL**, in a general sense, something belonging to or partaking of the nature of ceremonies: thus we say, the ceremonial law, the ceremonial of princes, &c.

**CEREMONY**, an assemblage of several actions, forms, and circumstances, serving to render a thing more magnificent and solemn; particularly used to denote the external rites of religious worship, the formalities of introducing ambassadors to audiences, &c.

*Master of the CEREMONIES*, an officer instituted by king James I. for the more honourable reception of ambassadors



ambassadors and strangers of quality: he wears about his neck a chain of gold, with a medal under the crown of Great-Britain, having on one side an emblem of peace, with this motto, *Beati pacifici*; and on the other, an emblem of war, with *Dieu et mon droit*: his salary is 300*l. per annum.*

*Assistant master of the CEREMONIES*, is to execute the employment in all points, whensoever the master of the ceremonies is absent. His salary is 14*l.* 13*s.* 4*d. per annum.*

*Marshal of the CEREMONIES*, is their officer, being subordinate to them both. His salary is 100*l. per annum.*

CERES, in the heathen mythology, the inventor or goddess of corn.

CEREUS, in botany, a genus of plants, whose flower is composed of a number of narrow pointed petals, which are radiated: in the base of the petals are inserted a great number of declining stamina. The fruit is an oblong, succulent berry, with a prickly skin, filled with small seeds, inclosed in a pulp.

There are divers species in this genus, some of which grow upright, others trail on the ground; but are all succulent, and without leaves.

CERINTHE, honey-wort in botany, a genus of plants, the flower of which consists of a single petal; the tube is short and thick, the limb is thicker than the tube, and somewhat bellied: it is divided into five segments, and the mouth is open and pervious: the fruit consists of two hard osseous bodies of an oval figure, gibbous on the outside, plane within, acute, emarginated, and containing two cells: the seeds are single, roundish, and acuminate.

Botanists enumerate five species of this genus, which are all natives of foreign countries.

CERINTHIANS, in church-history, Christian hereticks, followers of Cerinthus, who lived and published his heresy in the time of the apostles themselves: they did not allow that God was the author of the creatures, but said that the world was created by an inferior power: they attributed to this Creator an only son, but born in time, and different from the world: they admitted several angels and inferior powers; they maintained that the law and the prophets came not from God, but from the angels; and that the God of the Jews was only an angel: they distinguished between Jesus and Christ, and said, that Jesus was a mere man, born, like other men, of Joseph and Mary; but that he excelled all other men in prudence and wisdom; that Jesus being baptized, the Christ of the supreme God, that is, the Holy Ghost, descended upon him; and that by the assistance of this Christ, Jesus performed his miracles. It was partly to refute this sect that St. John wrote his gospel.

CERTIFICATE, in common law, a writing made in any court, to attest the truth of some transaction.

CERTIORARI, a writ which issues out of the Chancery, directed to an inferior court, demanding the record of a cause there depending, that justice may be done. The same writ issues out of the court of King's Bench, where the king would be certified of a record.

CERTITUDE, considered in the things or ideas which are the objects of our understanding, is a necessary agreement or disagreement of one part of our knowledge with another; as applied to the mind, it is the perception of such agreement or disagreement, or such a firm well-grounded assent as excludes not only all manner of doubt, but all conceivable possibility of a mistake.

There are three sorts of certitude, or assurance, according to the different natures and circumstances of things:

1. A physical or natural certitude, which depends upon the evidence of sense; as that I see such or such a colour, or hear such or such a sound: nobody questions the truth of this, where the organs, the medium, and the object are rightly disposed. 2. Mathematical certitude is that arising from mathematical evidence; such is, that the three angles of a triangle are equal to two right ones. 3. Moral certitude is that founded on moral evidence, and is frequently equivalent to a mathematical

one; as that there was formerly such an emperor as Julius Cæsar, and that he wrote the commentaries which pass under his name, because the historians of those times have recorded it, and no man has ever disproved it since. This affords a moral certitude, in common sense so great, that one would be thought a fool or a madman for denying it.

CERT-MONEY, an annual fine paid by the residents of several manors, in order to support the charges of the court leet.

CERVICAL, an epithet applied to such vessels, muscles, and nerves as pass through, or have their origin in, the vertebræ of the neck.

CERVIX, in anatomy, the neck; but is figuratively applied to the other parts of the body: thus, there is the cervix or neck of the bladder, uterus, &c.

CERUMEN, ear-wax, a natural excrement collected in the meatus auditorius, and discharged into that tube, by the adjacent glands.

CERUSE, white lead, a sort of calx of lead, made by exposing the plates of that metal to the vapour of vinegar.

CERVUS, the stag, or red deer, a well known quadruped, and ranged by Linnæus among the pecora.

CESARE, among logicians, one of the modes of the second figure of syllogisms, the minor proposition of which is an universal affirmative, and the other two universal negatives: thus

CE. No immoral books ought to be read:

SA. But every obscene book is immoral:

RE. Therefore no obscene book ought to be read.

CESSION, in law, an act by which a person surrenders and transmits to another a right which belonged to himself.

CESSION, in the ecclesiastical law, is when an ecclesiastical person is created a bishop, or when a parson of a parish takes another benefice without dispensation, or being otherwise qualified. In both these cases their first benefices become void by cession, without any resignation; and to those livings that the person had, who was created bishop, the king may present for that time, whosoever is patron of them; and in the other case the patron may present; but by dispensation of remainder, a bishop may retain some or all the preferments he was intitled to before he was made bishop.

CESTUS, among the ancient poets, a fine embroidered girdle said to be worn by Venus, and to which Homer ascribes the faculty of charming and conciliating love.

CETUS, the whale, in astronomy, a large constellation of the southern hemisphere. The stars in Cetus, in Ptolemy's and Hevelius's catalogues are 22, in Tycho's 21, and in the Britannick catalogue 78.

CHAFERY, a forge where the iron is hammered out into complete bars, and brought to perfection.

CHAFF, in husbandry, the husks of corn separated by threshing and winnowing. It also implies straw, &c. cut small, and given to horses and other cattle, mixed with corn.

CHAIN, in a general sense, implies a string of metal composed of several links or rings, engaged the one in the other.

CHAIN, in surveying, an instrument usually made of iron wire, but sometimes of brass, divided into an hundred equal parts, called links, and is used in measuring lengths in surveying of land; and if other proper instruments for taking or measuring angles are wanting, it may be used with great propriety for that purpose, and rather preferable to any other for expedition, accurateness, where the bearings are not required, or an accurate plot is not wanted, but only the true content of a piece of land. These chains are of different or various sorts, viz.

1. A chain of 100 feet long, each link consequently one foot long; at each tenth foot there is a plate of brass with a figure engraved upon it, shewing readily how many links are from the beginning of the chain; and for more ease in reckoning, there is, or should be, a brass ring at every five links, that is one between every two plates.



2. A chain of  $16\frac{1}{2}$  feet long, and made so as to contain an hundred links, with rings at every tenth link. This chain is most useful in measuring gardens or orchards by pole or perch measure.

3. A chain of four poles or perches in length, called Gunter's chain, being sixty-feet, or twenty-two yards, which being divided into one hundred parts, or links, each link consequently must contain 7.92 inches. It is usual to cut pieces of brass at every tenth link, and that at the fiftieth link is round, but all the rest are forked, or cut with points. Thus at ten links, from the beginning, is a piece of brass with one horn or point; at twenty with two, at thirty with three, at forty with four, and at fifty a round piece. Likewise it must be remarked, that it does not proceed from fifty to sixty, but from each end to fifty. This chain is what is commonly used by surveyors, and is of all others the most useful. Sometimes instead of the forked points above-mentioned in the pieces of brass, they are made round, with each a proper number of holes to distinguish them, but these are not so good, the holes being apt to fill with dirt, and cause mistakes, which in every thing ought carefully to be avoided.

When any line, side of a field, &c. is to be measured with this chain, you need not regard any other denomination but chains and links, which set down in the same manner as decimals: thus, if the side or line measured seven chains, forty-seven links, you must write it down thus; 7.47, which is nothing more than expressing it decimally seven chains, and forty seven one-hundredths. Again, if it was fifteen chains nine links you had to put down, write it thus, 15.09, always remembering, if the links to be writ down are under ten, to place a cypher before the quantity as in the last.

CHAINS, in naval affairs, strong plates or links of iron bolted to the timbers on each side of all the masts, by which the shrouds are drawn tight and fastened. There is a broad plank or thick scaffold, called the channel, placed edge-ways on the ship's side, through which they pass in order to keep the shrouds off the upper-rails and gunnels; that is, the upper part of the ship's side.

CHAIN-SHOT, in artillery, is formed by having a short chain which fastens two cannon-balls together. These are more particularly used in the sea-service for cutting and mangling a ship's rigging, and carrying away her masts.

CHALAZA, among naturalists, a white knotty sort of string at each end of an egg, formed of a plexus of the fibres of the membranes, whereby the yolk and white are connected together. See the article EGG.

CHALCEDONY, *Chalcedonius*, in natural history, a genus of semi-pellucid gems, of an even and regular, not tabulated texture; of a semi-opaque, crystalline basis, and variegated with different colours, dispersed in form of mists and clouds; and, if nicely examined, found to be owing to an admixture of various kinds of earths, but imperfectly blended in the mass, and often visible in distinct molecular.

CHALCIDICA, or CHALCIDICUM, in ancient architecture, a magnificent hall belonging to a tribunal or court of justice.

CHALCITIS, the name given by the ancients to the brownish-red chalcantum, of a soft and friable substance, and shewing a very irregular surface when broken; being composed of five or six series of short, waved, and undulated stræ.

CHALDRON, an English dry measure, consisting of 36 bushels, heaped up according to the sealed bushel kept at Guild-hall, London: but on ship-board, 21 chaldron of coals are allowed to the score.

CHALICE, the cup or vessel used to administer the wine in the sacrament; and by the Roman Catholics in the mass.

CHALK, the English name of the white dry marl, with a dusky surface, found in hard masses.

Chalk is a lasting manure for such lands as it agrees with, which are particularly those of a cold sour nature, and stiff untractable clays. Pliny tells us, it was the custom of the ancient Britons to chalk their lands, by which they received a great and lasting improvement.

Farmers are apt not to distinguish sufficiently between the different kinds of chalk. The hard; dry, and firm, is much the fittest for burning into lime, but the fat, unctuous chalk is by far the best to be used crude. This oily, viscous sort of chalk, is used in many places instead of marl, to which it is nearly allied, though of an inferior quality. It is even called marl in the Isle of Wight, where the chalk is of a remarkable fat soapy nature; and they sometimes lay twenty-five waggon-loads of it upon an acre of ground.

If chalk be laid on clay, it will in time be lost, and the ground again return to its clay; and if the clay be laid on chalk, in time the clay will be lost, and the ground return again to its chalky substance. Many people think the land, on which the other is laid for a manure, being predominant, converts the manure into its own soil; but I conceive, in both cases, the chalk and clay is filtrated through the land, on which it is laid, by time, and, being soluble by rains into small corpuscles, is washed through the land on which it is laid; for neither of these manures is able to unite, in its finest corpuscles with the corpuscles of the land on which it is laid, so as to form so strict an union and texture with it as the land doth with itself, and is therefore liable to be borne downwards with rains, till no sign of it be left.

Chalk laid on hop-clover and rye-grass is a mighty sweetener and improver of these grasses, being laid upon it after harvest, at the beginning of winter, or whenever one can best tend it; the benefit will be soon conspicuous, especially if the ground be a four clay, and apt to run to coarse grass.

Black CHALK, among painters, denotes a kind of ochreous earth, of a close structure, and fine black colour, used in drawing upon blue paper.

Red CHALK, an indurated clayey ochre, common in the colour shops, and much used by painters and artificers.

CHALKY-LAND, that lying on a chalky bottom, whereby it is strongly impregnated with the virtues of the chalk.

These lands naturally produce may-weed, poppies, &c. saintfoin and trefoil likewise agree with them; and their best produce of corn is barley or wheat, though oats will likewise do well on them.

The best manure for chalky lands is rags, dung, and folding of sheep. If rain happens to fall on them just after sowing, it binds the earth so hard, that the corn cannot pass through it; to prevent which misfortune, it is usual to manure these lands with half-rotten dung, with which some mix sand.

CHALLENGE, a cartel, or invitation to a duel, or other combat.

CHALLENGE, in law, an exception made to jurors returned on a trial.

CHALYBEAT, an epithet applied by physicians to any liquid impregnated with the particles of iron or steel.

CHAMADE, in war, a signal made by beat of drum for a conference with the enemy.

CHAMÆLEON, in zoology, a species of lizard, of a darkish ash-colour, having a short rounded tail, and five toes on each foot, two or three of which adhere together.

CHAMÆMILUM, chamomile, in botany, a genus of plants ranged by Linnaeus among the syngenesia polygamia superflua. Its flower is of the compound, radiated kind, standing solitary upon a long naked pedicle, and having a yellow convex disk.

This is a very common plant, growing wild upon commons, and other waste lands in many parts of England, particularly in moist and shady places, in which it most delights.

It is a trailing perennial plant, which puts forth roots from the joints of its branches as they lie on the ground, and by that means spreads and multiplies exceedingly; so that whoever would cultivate it, need only procure a few slips of it in the spring, and plant them about a foot asunder, that they may have room to spread; they will soon cover the ground.

Chamomile walks were formerly a sort of fashion in gardens;



gardens; and indeed they look pretty enough for some time after they were mowed and rolled: but they are now entirely out of use, because this plant is very apt to decay in large patches, which then become disagreeable to the eye.

The chamomile flowers for medicinal uses should be of the single kind; but the market people generally sell the double, because they are the largest.

The double flowered sort of chamomile is as hardy as the single, and may be propagated in the same manner.

Chamomile flowers, besides their general virtue as a bitter, are supposed to possess some degree of a carminative, anodyne, and antispasmodick virtue, depending on their odorous matter. Accordingly they are recommended in cholicks of different kinds, particularly such as arise from flatulencies or cold; in hysterick and hypochondriack disorders, and intermitting fevers, where a viscosity of the humours, or obstructions of the viscera render the Peruvian bark ineffectual.

CHAMÆRITYS, ground-pine, in botany, the name of a plant which Linnæus considers as a species of the Teucrium, but Tournefort as a distinct genus.

It is a low, hairy creeping plant, with square stalks, whitish clammy leaves, deeply cut into three long narrow segments, like those of the pine tree, set in pairs at the joints; and yellow labiated flowers, without pedicles, and wanting the upper lip. It is an annual plant, grows wild in sandy and chalky grounds in some parts of England, and flowers in July.

The leaves of ground pine are recommended as aperients, and corroboratives of the nervous system, but are seldom used.

CHAMBER, in building, any room situated between the lowermost and the uppermost rooms: in most houses there are two, in others three, or more stories of chambers.

CHAMBER, in policy, the place where certain assemblies are held, also the assemblies themselves. Of these, some are established for the administration of justice, others for commercial affairs.

CHAMBER of a Cannon, in artillery, that part of the bore of a cannon which receives the powder with which it is charged.

CHAMBER of a Mine, the furnace or cavity at the inner end of the mine that receives the charge of powder, by which the earth and works over it are blown up.

CHAMBER of a Mortar, the space where the powder lies, and which is considerably larger than the other part of the cylinder.

CHAMBER of a Pump, that part of the tube in which the piston works. See the article PUMP.

CHAMBERLAIN, an officer charged with the management and direction of a chamber.

There are almost as many kinds of chamberlains as chambers, the principal are these.

Lord CHAMBERLAIN of Great-Britain, the sixth great officer of the crown; to whom belongs livery and lodging in the king's court; and there are certain fees due to him from each archbishop or bishop, when they perform their homage to the king; and from all peers at their creation, or doing their homage. At the coronation of every king, he is to have forty ells of crimson velvet for his own robes. This officer, on the coronation day, is to bring the king his shirt, coif, and wearing cloaths; and after the king is dressed, he claims his bed, and all the furniture of his chamber for his fees: he also carries at the coronation, the coif, gloves, and linen to be used by the king on that occasion; also the sword and scabbard, the gold to be offered by the king, and the robes-royal and crown: he dresses and undresses the king on that day, waits on him before and after dinner, &c.

To this officer belongs the care of providing all things in the house of lords, in the time of parliament; to him also belongs the government of the palace of Westminster: he disposes likewise of the sword of state, to be carried before the king, to what lord he pleases.

Lord CHAMBERLAIN of the Household, an officer who has the oversight and direction of all officers be-

longing to the king's chambers, except the precinct of the king's bed-chamber.

He has the oversight of the officers of the wardrobe at all his majesty's houses, and of the removing wardrobes, or of beds, tents, revels, musick, comedians, hunting, messengers, &c. retained in the king's service. He moreover has the oversight and direction of the serjeants at arms, of all physicians, apothecaries, surgeons, barbers, the king's chaplains, &c. and administers the oath to all officers above stairs.

Other chamberlains, are those of the king's court of Exchequer, of North Wales, of Chester, of the city of London, &c. in which cases this officer is generally the receiver of all rents and revenues belonging to the place whereof he is chamberlain.

In the Exchequer there are two chamberlains, who keep a controulment of the pells of receipts and exitus, and have certain keys of the treasury, and records: They also keep the keys of that treasury where the leagues of the king's predecessors, and divers ancient books, Doom's-day-book, and the Black-book of the Exchequer, remain.

CHAMBERLAIN of London, keeps the city-money, which is laid up in the chamber of London: he also presides over the affairs of masters and apprentices, and makes free of the city, &c.

His office lasts only a year, but the custom usually obtains to re-choose the same person, unless charged with any misdemeanor in his office.

CHAMBRANLE, among masons and builders, is an ornament of wood or stone, surrounding the three sides of doors, windows, and chimnies.

CHAMFER, or CHAMFRET, in architecture, is an ornament consisting of half a scotia, being a kind of small furrow or gutter on a column.

CHAMFERING, in architecture, a term used for the cutting the under edge of any thing aslope or level.

CHAMOIS, or CHARMOIS-GOAT, in zoology, the name of the rupi capra, a creature of the goat-kind, with erect and short but hooked horns. It is from the skin of this animal that the chamois leather is made.

CHAMOMILE, *Chamæmilum*, in botany. See CHAMÆMILUM.

CHAMPAIN, or Point CHAMPAIGN, in heraldry, a mark of dishonour in the coat of arms of him who kills a prisoner of war, after he has cried quarter.

CHAMPARTY, or CHAMPERTY, in law, a contract made with either the plaintiff or defendant in any suit at law, for giving part of the land, debt, &c. sued for, to the party who undertakes the process at his own proper charges, provided he succeeds therein.

CHAMPION, a person who undertakes a combat in the place or quarrel of another; and sometimes the word is used for him who fights in his own cause.

CHAMPION of the King, a person whose office it is, at the coronation of our kings, to ride armed into Westminster-hall, while his majesty is at dinner there, and, by the proclamation of a herald, make challenge to this effect, viz. "That if any man shall deny the king's title to the crown, he is there ready to defend it in single combat, &c." Which done, his majesty drinks to him, and sends him a gilt cup, with a cover, full of wine, which the champion drinks, and has the cup for his fee.

This office, ever since the coronation of Richard II. has been continued in the family of Dymocke, who held the manor of Scrivelsby; near Horncastle, in Lincolnshire, hereditary from the family of the Marmions, who had it before, by grand serjeantry; on condition that the lord thereof should be the king's *Champion*.

CHANCE, in a general sense, a term applied to events, not necessarily produced, as the natural effects of any proper foreknown cause.

CHANCE, is more particularly used for the probability of an event, and is greater or less, according to the number of chances by which it may happen, compared with the number of chances by which it may either happen or fail.

Doctrine of CHANCE, or Laws of CHANCE, is that art or method, by which we discover, by certain rules, the probability that any event has of happening or failing.



ing. Thus, supposing it were required to express the probability of throwing either an ace or duce at the first throw with a single die; then there being in all six different chances or ways that the die may fall, and only two of them for the ace or duce to come upward, the probability of the happening of one of those will be  $\frac{2}{6}$  or  $\frac{1}{3}$ , and that of the contrary  $\frac{4}{6}$  or  $\frac{2}{3}$ .

Or more generally, supposing there be  $a$  chances for the happening of an event, and  $b$  chances for the contrary; then the probability of happening will be  $\frac{a}{a+b}$ , and that of failing  $\frac{b}{a+b} = 1 - \frac{a}{a+b}$ . From hence it appears, that if the probability of the happening of an event, be subtracted from unity, the remainder will be the probability of its failing; and *vice versa*.

The expectation on an event, is considered as the present certain value or worth of whatever sum or thing is depending on the happening of that event, and is composed of that sum, and the probability of obtaining it. Therefore if the expectation on an event be divided by the value of the thing expected on the happening of that event, the quotient will be the probability of happening. For example, suppose A to throw once with a single die, on condition, that if either an ace or duce comes up, he shall be entitled to twenty shillings; then the probability of his receiving the said sum is  $\frac{1}{3} \times 20s.$  or  $\frac{1}{3}$  of 20s. will be the expectation in this case.

Again, suppose it was required to find the probability that two assigned events should both happen. Let the probability of the happening of the first of the two events be denoted by  $\frac{a}{a+b}$ , and that of the second by  $\frac{c}{c+d}$ ; and suppose the happening of both to entitle a person B to the sum S. Now if the first of these should happen, it is manifest, that from that time till the second is determined, the expectation of B will be  $\frac{c}{c+d} \times S$ , or so much is the sum that he might in that circumstance receive as an equivalent for his chance of obtaining that sum S. But his probability of getting into this circumstance, or being entitled to the value  $\frac{c}{c+d} \times S$ , being only  $\frac{a}{a+b}$ , this expectation therefore, before either of the events is decided, can be only  $\frac{a}{a+b}$  part of  $\frac{c}{c+d} \times S$ , or  $\frac{a}{a+b} \times \frac{c}{c+d} \times S$ ; therefore the required probability of receiving it, or of both the events happening is only  $\frac{a}{a+b} \times \frac{c}{c+d}$ , that is, the probability that any two assigned events shall both happen will be equal to the product of the probabilities of those events happening singly.

*Coroll.* Since the probability of the happening of each of these events may be compounded of the probabilities of the happening of two others, as well as that of receiving the sum S of these two, &c. it follows, that the probability of the happening of any given number of events, is equal to the product of all the probabilities of the happening of those events considered singly.

**CHANCEL**, that part of the church separated by a balustrade, and in which the communion table or altar is placed.

**CHANCELLOR**, an officer supposed to have been originally a notary or scribe under the emperors, and called cancellarius from his sitting behind a lattice, or cancellus, to avoid being crowded by the people.

*Lord High CHANCELLOR of Great Britain, or Lord Keeper of the Great Seal*, is the highest person of the law, and takes place after the king and princes of the blood, in all civil affairs.

**CHANCELLOR of a Cathedral**, an officer that is to hear lessons and lectures read in that church, either by himself or his vicar; to correct and set right the reader, when he reads amiss; to inspect schools; to hear causes, apply the seal, write and dispatch the letters of the chapter, keep the books, take care there be frequent preachings, both in the church and out of it, and assign the office of preaching to whom he pleases.

**CHANCELLOR of a Diocese**; a lay officer under a bishop, who is judge of his court.

**CHANCELLOR of an University**, is he who seals the diplomas or letters of degrees, provision, &c. given in the university.

**CHANCELLOR of the Order of the Garter**, and other military orders, is an officer who seals the commissions and mandates of the chapter and assembly of the knights, keeps the register of their proceedings, and delivers acts thereof under the seal of their order.

**CHANCELLOR of the Exchequer**, an officer who presides in that court, and takes care of the interest of the crown. He is always in commission with the lord treasurer, for the letting of crown lands, &c. and has power with others to compound for forfeitures of bonds upon penal statutes. He has also great authority in managing the royal revenues, and in matters relating to first-fruits.

**CHANCELLOR of the Duchy of Lancaster**, is an officer in that court, whose principal business is to judge and determine all controversies between the king and his tenants, with regard to the duchy-lands, and to direct all the other affairs of the king belonging to that court.

**CHANCERY**, the highest court of judicature in this kingdom, next the parliament, and of very ancient institution.

The jurisdiction of this court is of two kinds, ordinary or legal, and extraordinary or absolute. The ordinary jurisdiction is that wherein the lord chancellor in his proceedings and judgments is bound to observe the order and method of the common law; and, in such cases, the proceedings were formerly in Latin, and enrolled in the petty bag office; and the extraordinary or unlimited power is that jurisdiction which this court exercises, in cases of equity, wherein relief is to be had by way of bill and answer, in English. The ordinary court holds plea of recognizances acknowledged in the chancery, writs of scire facias for repeal of letters patent, writs of partition, &c. and also, of all personal actions, by or against officers of the court, and by acts of parliament of several offences and causes: all original writs, commissions of bankrupts, of charitable uses, of idiots, lunacy, &c. issue out of this court, for which it is always open; whereas the other courts sit only in term-time, and have no power to act, as courts of justice, out of term.

This extraordinary court, or court of equity, proceeds by the rules of equity and conscience, and moderates the rigour of the common law: it gives relief for and against infants, notwithstanding their minority; and for and against married women, notwithstanding their coverture. All frauds and deceits for which there is no redress at common law; all branches of trust and confidence; and accidents, as to relieve obligers, mortgagers, &c. against penalties and forfeitures, where the intent was to pay the debt, are here redressed. This court will also give relief against the extremity of unreasonable engagements, entered into without consideration; oblige unreasonable creditors to compound with an unfortunate debtor; and make executors, &c. give security and pay interest for money, which lie long in their hands. But in all cases where the plaintiff can have his remedy at law, he ought not to be relieved in chancery; and a thing which may be tried by a jury, is not triable in this court. Trials and issues at law are frequently directed out of the chancery; and sometimes it is ordered, that, after trial, the parties shall resort to the court on the equity reserved, &c. This court will not retain a suit for any thing under ten pounds value, except it be in cases of charity; nor for lands, &c. under forty shillings *per annum*, and refuses relief to suits where the substance of them tends to the overthrow of an act of parliament, or any fundamental point of the common law. It is common to give relief in chancery; notwithstanding there is any agreement between the parties, that there shall be no relief in law or equity.

The king cannot create a court of equity, but the same must be done by act of parliament; and though the power of the chancery is very great, and it may restrain



restrain other courts that exceed their jurisdiction, and remove suits to itself by certiorari, yet it is no court of record; and therefore, it is said, can bind the person only, and not the estate of the defendant, &c. and, if he will not obey the decree of the court, he must be committed to the Fleet till he does. By statute, the court of chancery is to follow the king: and whosoever shall find himself aggrieved by any statute, he shall have his remedy in chancery. 36 Edward III. c. 9.

The form of pleading in this court is much after the manner of the civil law, by bills, examination of witnesses, subpoena, &c. In this court all patents, most sorts of commissions, deeds between parties touching lands and estates, treaties with foreign princes, &c. are sealed and enrolled. Out of it are issued writs to convene the parliament and convocation, proclamations and charters, &c. for the several officers belonging to the court of chancery.

*Apostolick* CHANCERY, a court in the church of Rome belonging to the pope.

CHANDELIER, in military affairs, a kind of moveable parapet consisting of a wooden frame on which fascines and faggots are laid to cover the workmen when at work in the trenches.

CHANGE OF CROPS, a very judicious part of husbandry, consisting in a change of different species of grain on the same soil.

Experience soon taught men, that even the most fruitful soil cannot constantly yield the same grain; and this of course laid them under a necessity of seeking for means to remedy the defect. They found the plough the most ready, and perhaps the most effectual: and hence all the ancient writers so highly commend a thorough ploughing. At the same time the apparent loss of the produce of the ground during the year of fallow, put them upon enquiring how this inconvenience might be prevented, consistently with keeping the land in good heart. Repeated observations convinced the Romans, the most attentive of all nations to every thing relative to husbandry, that, besides the alternate resting of the land, wheat may, as Pliny observes, be sown after lupines, vetches, beans, or any other plant which has the quality of fertilizing and enriching the soil. This, says Mr. Lisle, deserves to be well noticed, because our farmers imagine they cannot make their rent, if they pay twelve shillings an acre, without sowing their land every year; nor will they be persuaded to lay it down to grass.

CHANGES, in arithmetick, the variations, or permutations of any number of things, with regard to the position, order, &c.

The method of finding out the number of changes, is by a continual multiplication of all the terms in a series of arithmetical progressionals; whose first term, and common difference, is unity, or 1; and last term the number of things proposed to be varied, viz.  $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7$ , &c. as will appear from what follows:

1st. If the things proposed to be varied are only two, they admit of a double position, as to order of place, and no more.

$$\text{Thus, } \left\{ \begin{array}{c} 1 \cdot 2 \\ 2 \cdot 1 \end{array} \right\} = 2 = 1 \times 2$$

2d. And, if three things are proposed to be varied, they may be changed six several ways, as to their order of places, and no more.

For, beginning with 1, there will be  $\left\{ \begin{array}{c} 1 \cdot 2 \cdot 3 \\ 1 \cdot 3 \cdot 2 \end{array} \right\}$

Next, beginning with 2, there will be  $\left\{ \begin{array}{c} 2 \cdot 1 \cdot 3 \\ 2 \cdot 3 \cdot 1 \end{array} \right\}$

Again, beginning with 3, it will be  $\left\{ \begin{array}{c} 3 \cdot 1 \cdot 2 \\ 3 \cdot 2 \cdot 1 \end{array} \right\}$

Which in all make 6 or 3 times 2, viz.  $1 \times 2 \times 3 = 6$ .

3d. Suppose 4 things were supposed to be varied, then they admit of 24 several changes, as to their order of different places.

For, beginning the order with 1, it will be,  $\left\{ \begin{array}{c} 1 \cdot 2 \cdot 3 \cdot 4 \\ 1 \cdot 2 \cdot 4 \cdot 3 \\ 1 \cdot 3 \cdot 2 \cdot 4 \\ 1 \cdot 3 \cdot 4 \cdot 2 \\ 1 \cdot 4 \cdot 2 \cdot 3 \\ 1 \cdot 4 \cdot 3 \cdot 2 \end{array} \right\}$

And for the same reason there will be 6 different changes when 2 begins the order, and as many when 3 and 4 begin the order; which in all is  $24 = 1 \times 2 \times 3 \times 4$ . And by this method of proceeding it may be made evident that 5 things admit of 120 several variations or changes; and 6 things of 720, &c. as in the following table:

The number of things proposed to be varied.	The manner how their several variations are produced.	The different changes or variations every one of the proposed numbers can admit of.
1	$1 \times 1$	$= 1$
2	$1 \times 2$	$= 2$
3	$2 \times 3$	$= 6$
4	$6 \times 4$	$= 24$
5	$24 \times 5$	$= 120$
6	$120 \times 6$	$= 720$
7	$720 \times 7$	$= 5040$
8	$5040 \times 8$	$= 40320$
9	$40320 \times 9$	$= 362880$
10	$362880 \times 10$	$= 3628800$
11	$3628800 \times 11$	$= 39916800$
12	$39916800 \times 12$	$= 479001600$

They may be thus continued to any assigned number. Suppose to twenty-four, the number of letters in the alphabet, which will admit of 6204484017332394393600000 several variations.

CHANNEL, in architecture, that part of the Ionick capital which is under the abacus, and lies open upon the echinus or eggs, which has the centres or turnings on every side to make the volutes.

CHANNEL of the Volute, in the Ionick capital, the face of the circumvolution inclosed by a listel.

CHANNEL, in geography, an arm of the sea, or a narrow sea between two continents, or between a continent and an island. Such are the British channel, St. George's channel, the channel of Constantinople, &c.

CHANNEL of a River, the bed of a river. See the article RIVER.

CHANNEL, in hydrography, the deepest part of a river, harbour, or strait, which is rendered the most convenient for the track of shipping.

CHANNEL, in naval architecture, a broad thick plank, placed edgewise on a ship's side, abreast of all the masts: they are used to extend the shroud by which the mast is secured to a proper width. See CHAINS.

CHANNEL of the Mouth of a Horse, that concavity in the middle of the lower jaw, appointed for a place to the tongue; which being bounded on each side by the bars, terminates in the grinders. It should be large enough not to be pressed with the bit mouth.

CHANTLATE, in building, a piece of wood fastened near the ends of the rafters, and projecting beyond the wall to support two or three rows of tiles, so placed as to prevent the rain water from trickling down the sides of the walls.

CHANTOR, a singer in the choir of a cathedral. The word is almost grown obsolete, chorister or singing-man being commonly used instead of it.

CHANTOR, is used by way of excellence for the precentor or master of the choir, which is one of the first dignities of the chapter.

CHANTRY, or CHAUNTRY, a church or chapel, endowed with lands, &c. for the maintenance of one or more priests to say mass for the souls of the founders.

CHAOLOGY, the history or description of the chaos.

CHAOS, that confusion in which matter lay before the Deity began the six days work of creation.

The ancient poets, and Ovid in particular, represent the chaos thus: that there was neither sun to make any day,



day, nor moon to enlighten the night; that the earth was not yet hung in the circumambient air, nor the sea bounded by any shore; but that earth, air, and water, were one undigested mass; consequently, that the earth was not hardened to its proper element, the water was unnavigable, the air gross and not enlightened, and, in short, there was nothing in the universe that had put on its proper form.

All the ancient sophists, sages, &c. hold that chaos was the first principle; the poets make him a god, who was the father of all the other gods. Among the moderns, Dr. Burnet represents the chaos, out of which the world was framed, to be at first entire, undivided, and universally rude and deformed; then shews how it came divided into its respective regions, and observes, that, excepting Aristotle, and a few others, who asserted that the world was always, from eternity, of the same form and structure as at present, it has been a prevailing opinion in all ages, that what we call the terrestrial globe, was originally an undigested mass of heterogeneous matter called chaos, and no more than the rudiments and materials of the present world. According to Mr. Whiston, the ancient chaos, or origin of our earth, was the atmosphere of a comet; so that every planet with him is a comet, formed into a lasting condition; and a comet is a chaos or planet, unformed in its primæval state.

**CHAPE**, the metalline part placed at the end of a scabbard, to prevent the point of the sword from piercing through it.

**CHAPEAU**, in heraldry, an ancient cap of state worn by dukes. The outside of it was scarlet-coloured velvet, and lined with fur.

**CHAPEL**, a place for divine worship, served by an incumbent under the denomination of a chaplain.

**CHAPITERS**, in architecture, the same with capital. See the article **CAPITAL**.

**CHAPLAIN**, an ecclesiastick who officiates in a chapel.

The king of Great-Britain hath forty-eight chaplains in ordinary, usually eminent doctors in divinity, who wait four each month, preach in the chapel, read the service to the family, and to the king in his private oratory, and say grace in the absence of the clerk of the closet. Besides, there are twenty-four chaplains at Whitehall, fellows of Oxford and Cambridge, who preach in their turns, and are allowed 30*l.* *per annum* each. According to a statute of Henry VIII. the persons vested with a power of retaining chaplains, together with the number each is allowed to qualify, is as follows: An archbishop, eight; a duke or bishop, six; marquess or earl, five; viscount, four; baron, knight of the garter, or lord-chancellor, three; a dutches, marchioness, countess, baroness, the treasurer and comptroller of the king's house, clerk of the closet, the king's secretary, dean of the chapel, almoner, and master of the rolls, each of them two; chief justice of the king's bench, and warden of the cinque ports, each one. All these chaplains may purchase a licence or dispensation, and take two benefices with cure of souls. A chaplain must be retained by letters testimonial under hand and seal: for it is not sufficient that he serve as chaplain in the family.

**CHAPLET**, a string of beads used by the Roman catholics to count the number of their prayers.

**CHAPLET**, in architecture, a small ornament carried into round beads, pearls, olives, &c.

**CHAPPE**, in heraldry, the dividing an escutcheon by lines drawn from the centre of the upper edge to the angles below into three parts, the sections on the sides being of a different metal, or colour from the rest.

**CHAPTER**, in ecclesiastical polity, implies a society or community of clergymen belonging to cathedrals and collegiate churches.

**CHAPTER**, also implies an assembly held by religious orders for regulating their affairs.

**CHAPTER**, in literary affairs, signifies a head, or division of a book, in order to keep the different particulars treated of more clear and distinct.

**CHAPTRELS**, in architecture, imply the parts on which the feet of an arch stand.

**CHARACTER**, in a general sense, implies any mark used for representing either ideas or objects: thus letters are characters or marks of certain sounds; words are characters of ideas, &c. See **LETTER**, &c.

**Mathematical CHARACTERS**, are certain marks invented by mathematicians, for avoiding prolixity, and more clearly conveying their thoughts to learners, and are as follow:

$=$  is the mark of equality (though Des Cartes and some others used this  $\alpha$ ) and signifies that the quantities on each side of it are equal to one another; as  $a=b$  signifies that  $a$  is equal to  $b$ .

$+$  in algebra, is the sign of the real existence of the quality it stands before, and is called an affirmative or positive sign.

This affirmative sign is also the mark of addition, and signifies that the quantities on each side of it are added together; as, if you see  $a+b$ , or  $3+5$ , it implies that  $a$  is added to  $b$ , or 3 added to 5, and is usually read  $a$  more  $b$ .

$-$  This is the note of negation, negative existence, or nonentity; and whenever it stands alone before any quantity, it shews that quantity to be less than nothing. And, therefore, such quantities are called negative quantities; as  $-5$  is a negative quantity, or 5 less than nothing.

This negative sign is also the mark of subtraction, and signifies that the quantities on each side of it are subtracted from each other; thus when you see  $a-b$  it is read  $a$  less  $b$ , or  $b$  subtracted from  $a$ .

$\infty$ , or  $l$ , is the character expressing the difference between two quantities, when it is not known which is the greater of the two; for here the sign  $-$  cannot be used, because it supposes the quantity following to be always less than that of going before it.

$\times$  is the sign of multiplication, shewing that the quantities on each side the same are to be multiplied by one another; as  $a \times b$ , or  $AB \times CD$ , is to be read  $a$  multiplied by  $b$ , or  $AB$  multiplied by  $CD$ .

$\div$  is the mark of division, signifying that the first of the two quantities between it is divided by the latter; as  $a \div b$  signifies that  $a$  is divided by  $b$ . This however is often expressed like a fraction, thus  $\frac{a}{b}$ .

$\odot$  is the character of involution, that is, of producing the square of any quantity, or of multiplying any quantity into itself. In some books of algebra it is placed in the margin, and shews, that the step of the equation, against which it stands, is to be multiplied into itself; or, if it be a square already, then to be raised to that power that the index set after the character expresses.

$\sqrt{\phantom{x}}$  is the character of evolution, that is, of extracting the roots out of several powers, and is the reverse of the last mentioned sign.

$::$  is the mark of geometrical proportion disjunct, and is usually placed between two pair of equal ratios; as  $3:6::4:8$ , shews that 3 is to 6 as 4 is to 8.

$\div\div$  is the mark of geometrical proportion continued, and implies the ratio to be still carried on without any interruption; as 2, 4, 8, 16, 32, 64  $\div\div$ .

$\sqrt[n]{\phantom{x}}$  is the sign of radicality, and shews (according to the index of the power that is set over or after it) that the square, cube, or other root, is extracted, or is to be so out of any quantity, as  $\sqrt{16}$ , or  $\sqrt[2]{16}$ , or  $\sqrt[2]{(2) 16}$  is the square root of 16.

This character sometimes affects several quantities, distinguished by a line drawn over them thus,  $\sqrt{b+d}$  denotes the square root of the sum of  $b$  and  $d$ . When any term or terms of an equation are wanting, they are generally supplied by one or more asterisks: thus in the equation,

$y^2 + py + \frac{1}{4}p^2 + q \} = 0$ , the term  $+py$  vanishing, is marked with an asterisk, as  $y^2 * -\frac{1}{4}p^2 + q$ .

$>$  or  $\sqsupset$  are signs of majority; thus,  $a > b$  expresses that  $a$  is greater than  $b$ .

$<$  or  $\sqsubset$  are signs of minority; and when we would denote that  $a$  is less than  $b$ , we write  $a < b$ , or  $a \sqsubset b$ .

CHA-



CHARACTERS *used in Astronomy.*

## Characters of the planets.

♄ Saturn	☉ Sun	☾ Moon
♃ Jupiter	♀ Venus	♁ Earth
♂ Mars	☿ Mercury	

## Of the signs.

♈ Aries	♌ Leo	♐ Sagittarius
♉ Taurus	♍ Virgo	♑ Capricornus
♊ Gemini	♎ Libra	♒ Aquarius
♋ Cancer	♏ Scorpio	♓ Pisces

## Characters of the aspects.

♌ or S Conjunction	Δ Trine
SS Semisextile	Bq Biquintile
* Sextile	Vc Quincunx
Q Quintile	8 Opposition
□ Quartile	8 Dragon's head
Td Tredecile	8 Dragon's tail

## Characters of time.

A. M. *ante meridiem*, before the sun comes upon the meridian.

O. or N. noon.

P. M. *post meridiem*, when the sun is past the meridian.

Besides the above characters in astronomy, there are a few more which were used by the late royal professors of astronomy, Dr. Bradley and Mr. Bliss, in their *Astronomical Observations*, the knowledge of which may be of some importance to those into whose hands the observations may fall.

The first is two dots placed after any observation, thus,  $\therefore$ , which signifies that this observation is a little doubtful, and not to be depended upon. The second is four dots, passed after an observation: thus  $\therefore$ , which signifies that the observation is very dubious, and must not be made use of for determining any motion in the heavens. The third is EC, in observations of the moon's altitude on the meridian, which signifies that the moon's centre was estimated, or its altitude taken as near as possible, both the upper and lower limb, at that time being invisible from its near proximity to the sun at the time of observation.

Lastly, N, Q, G, which signifies clock, which stands near the transit quadrant and old observatory. When any two of these are found joined together with any quantity of time after them, thus, QN or 40", signifies, that when the quadrant clock, and clock at the transit were compared together by a good stop-watch with a second hand, that Q was faster, or before that time forty seconds.

It may not be amiss to remark here, that astronomers not only use the seven following characters, as has been shewn above, but likewise to express the days of the weeks; ☉ Sunday, ☾ Monday, ♀ Tuesday, ♂ Wednesday, ♃ Thursday, ♀ Friday, ♄ Saturday.

CHARACTERS *in Geometry and Trigonometry.*

The character of parallelism	∇ equiangular, or similar
△ triangle	≡ equilateral
□ square	< an angle
□ rectangle	⊥ right angle
○ circle	⊥ perpendicular.

° denotes a degree; thus  $45^\circ$  implies 45 degrees. ' a minute; thus,  $50'$ , is 50 minutes. ", "", """, denote seconds, thirds, and fourths: and the same characters are used where the progressions are by tens, as it is here by sixties.

CHARACTERS *used in the arithmetick of Infinites.*

A dot over a letter is the character of an infinitesimal or fluxion; thus,  $\dot{x}$ ,  $\dot{y}$ , &c. express the fluxions or differentials of the variable  $x$  and  $y$ ; and two, three, or more dots denote second, third, or higher fluxions. Mr. Leibnitz, instead of a dot prefixes the letter  $d$  to the variable quantity, in order to avoid the confusion of

dots in the differencing of differentials. See the articles FLUXIONS and DIFFERENTIAL Calculus.

CHARACTERS *in Grammar, Rhetorick, Poetry, &c.*

( ) parenthesis	F. R. S. fellow of the royal society.
[ ] crotchet	
- hyphen	SS. T. D. doctor in divinity.
' apostrophe	
' emphasis or accent	V. D. M. minister of the word of God.
˘ breve	LL. D. doctor of laws.
ˆ dialysis	J. V. D. doctor of civil and canon law.
^ caret and circumflex	
“ quotation	
+ † and * references	M. D. doctor in physick.
§ section or division	A. M. master of arts.
¶ paragraph	A. B. bachelor of arts.

For the other characters used in grammar, see the articles COMMA, COLON, SEMICOLON, &c.

CHARACTERS *among the ancient Lawyers, and in ancient Inscriptions.*

§ paragraphs	C. code
ff digests	C. C. consuls
Scto senatus consulto	T. titulus
E. extra.	P. P. D. D. propria pecunia dedicavit.
S. P. Q. R. senatus populusque Romanus	D. D. M. dono dedit monumentum.
P. P. pater patriæ	

CHARACTERS *in Medicine and Pharmacy.*

℞ recipe	M. manipulus, a handful
ā, āā, or ana, of each alike	ful
℔ a pound or a pint	P. a pugil
℥ an ounce	P. Æ, equal quantities
ʒ a drachm	S. A, according to art
ʒ a scruple	q. s, a sufficient quantity
gr. grains	q. pl. as much as you please
℥ or ʒ, half of any thing	P. P. pulvis patrum, the jesuit's bark
cong. congius, a gallon	
coch. cochleare, a spoonful	

CHARACTERS used in musick, and of musical notes, with their proportions, are as follow:

⏏ character of a large	8	⏏ crochet	$\frac{1}{4}$
□ a long	4	⏏ quaver	$\frac{1}{8}$
□ a breve		⏏ semiquaver	$\frac{1}{16}$
○ a semibreve	1	⏏ demisemiquaver	$\frac{1}{32}$
⏏ minim	$\frac{1}{2}$		

✱ character of a sharp note: this character at the beginning of a line, or space, denotes that all the notes in that line are to be taken a semitone higher, than in the natural series; and the same affects all the octaves above or below, though not marked; but when prefixed to any particular note, it shews that note alone to be taken a semitone higher than it would be without such character.

♭ or b, character of a flat note: this is the contrary to the other above, that is a semitone lower.

⏏ character of a natural note: when in a line or series of artificial notes, marked at the beginning ♭ or ✱, the natural note happens to be required, it is denoted by this character.

♯ character of the treble cliff.

⏏ character of the mean cliff.

⏏: bass cliff.

$\frac{2}{4}$  or  $\frac{4}{8}$ , characters of common duple time, signifying the measure of two crotchets to be equal to two notes, of which four make a semibreve.

C ♯ ♯, characters that distinguish the movements of common time, the first implying flow, the second quick, and the third very quick.

$\frac{1}{2}$ ,  $\frac{3}{2}$ ,  $\frac{3}{4}$ ,  $\frac{3}{8}$ ,  $\frac{3}{16}$ , characters of simple triple time, the measure of which is equal to three semibreves, or to three minims.

$\frac{6}{4}$ , or  $\frac{6}{8}$ , or  $\frac{6}{16}$ , characters of mixed triple time, where the measure is equal to six crotchets or six quavers.

$\frac{9}{4}$ , or  $\frac{9}{8}$ , or  $\frac{9}{16}$ , or  $\frac{9}{32}$ , or  $\frac{9}{64}$ , characters of compound triple time.

$\frac{4}{12}$ ,  $\frac{8}{12}$ ,  $\frac{12}{12}$ , or  $\frac{1}{12}$ , or  $\frac{2}{12}$ , characters of that species of triple time called the measure of twelve times. See the article TRIPLE.



*Numeral* CHARACTERS, used to express numbers, are either letters or figures.

The Arabick character, called also the common one, because it is used almost throughout Europe in all sorts of calculations, consists of these ten digits, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0.

The Roman numeral character consists of seven masculine letters of the Roman alphabet, viz. I, V, X, L, C, D, M.

The I denotes one, V five, X ten, L fifty, C a hundred, D five hundred, and M a thousand.

The I repeated twice makes two, II; thrice, three, III; four is expressed thus IV, as I before V or X takes an unit from the number expressed by these letters. To express six an I is added to a V, VI: for seven, two, VII: and for eight, three, VIII: nine is expressed by an I before X, thus IX,

The same remark may be made of the X before L or C, except that the diminution is by tens; thus XL denotes forty, XC ninety, and LX sixty. The C before D or M diminishes each by an hundred.

The number five hundred is sometimes expressed by an I before a C inverted, thus, IC; and instead of M, which signifies a thousand, an I is sometimes used between two C's, the one direct, and the other inverted, thus CIC. The addition of C and O before or after, raises IC by tens, thus CCIC expresses ten thousand, CCCIC, a hundred thousand.

The Romans also expressed any number of thousands by a line drawn over any numeral less than a thousand; thus,  $\overline{V}$  denotes five thousand,  $\overline{LX}$  sixty thousand: so likewise  $\overline{M}$  is one million,  $\overline{MM}$  is two millions, &c.

CHARACTER, in epick and dramatick poetry, that peculiarity in the manners of any person, which distinguishes him from all others.

CHARACTERISTICK, some particular mark or character, whereby a person or thing is distinguished from others of the same kind.

CHARACTERISTICK of a *Logarithm*, is the same with the index. See the article LOGARITHMS.

CHARAG, a tribute paid by Christians and Jews, in the Turkish dominions to the Grand Signior.

CHARBON, in the manege, the mark, small spot or cavity in the corner teeth of a horse, and by which his age is known till he is seven years old, when the cavity fills up, and the tooth becomes smooth and equal. See AGE of a Horse.

CHARCOAL, a kind of fuel, consisting of half-burnt wood, much used by artificers of different professions; and that not only as a fuel, but for polishing brass or copper plates, &c.

The best charcoal for common uses is that made of oak; but in the manufacture of gun-powder they commonly use charcoal made of alder. See the article GUNPOWDER.

CHARDS of *Artichocks*, in gardening, the leaves of fair artichock-plants, tied and wrapped up in straw all over, but the top, during the autumn and winter; this makes them grow white, and lose some of their bitterness.

CHARDS of *Beets*, white beets covered over with dry dung, during the winter season, when they produce large tops, with a downy cotton shoot, which is the true chard to be used in pottages, intermesses, &c.

CHARGE, in gunnery, the quantity of gun-powder and ball, wherewith a gun is loaded for execution.

The rule for charging large pieces in war, are, that the piece be first cleaned or scoured within-side; that the proper quantity of powder be next driven in and rammed down; care however being taken that the powder, in ramming, be not bruised, because that weakens its effect; that a little quantity of paper, hay, lint, or the like, be rammed over it; and that the ball or shot be intruded.

If the ball be red hot, a tompion, or trencher of green wood, is to be driven in before it.

The common allowance for the charge of powder of a piece of ordnance is half the weight of the ball. In the British navy, the allowance for thirty-two pounders is but seven sixteenths of the weight of the bullet. But

a late author is of opinion, that if the powder in all ship cannon whatever was reduced to one-third of the weight of the ball, or even less, it would be of considerable advantage, not only by saving ammunition, but by keeping the guns cooler and quieter, and at the same time more effectually injuring the vessels of the enemy. With the present allowance of powder the guns are heated, and their tackle and furniture strained, and this only to render the bullets less efficacious: for a bullet which can but just pass through a piece of timber, and loses almost all its motion thereby, has a much better chance of rending and fracturing it, than if it passes through with a much greater velocity.

CHARGE, in heraldry, is applied to the figures represented on the escutcheon, by which the bearings are distinguished from one another: and it is to be observed, that too many charges are not so honourable as fewer.

CHARGE, in farriery, implies a preparation, of the consistence of a thick decoction. It is applied to the parts of a horse that are sprained, inflamed, &c.

CHARGE of *Lead*, denotes a quantity of thirty-six pigs of that metal.

CHARGED CYLINDER, in gunnery, implies that part of the chase of a gun, which contains the powder and ball.

CHARISIA, in heathen antiquity, a nocturnal festival, kept in honour of the graces.

CHARISTIA, a festival of the ancient Romans, celebrated in the month of February, wherein the relations by blood and marriage met, in order to preserve a good correspondence.

CHARITATIVE AID or SUBSIDY, in the canon law, a moderate allowance which a council grants a bishop, upon any urgent occasion, as when his revenues will not bear his expences to a council, &c.

CHARITY, *αγαπη*, among divines, one of the three grand theological graces, consisting of a principle of prevailing love to God and man, which effectually inclines one endued with it to glorify God, and to do good to others; to be patient, slow to anger, and ready to put up with wrongs; to shew kindness to all, and seek the good of others, though with prejudice to himself. A person endued therewith does not interpret doubtful things to the worst sense but the best; is sorry for the sins of others, but rejoices when any one does well, and is apt to bear with their failings and infirmities; and lastly, this grace is never lost, but goes with us into another world, and is exercised there. 1 Cor. xiii. 1, 4, 13.

CHARITY, *ελεημοσυνη*, among moralists, is used to signify the fruits and effects of the above grace, and consists in supplying the necessities of others, whether with money, counsel, assistance or the like. Matt. vi. 1, 2, 3, 4. Luke xi. 41. Acts iii. 2. & al.

CHARITY-SCHOOLS, schools erected by the voluntary contributions of the inhabitants of parishes, for teaching poor children to read and write, and other necessary parts of education. In most charity-schools the children are likewise clothed and put out to trades, services, &c. on the same charitable foundation.

CHARLATAN, an empirick, mountebank, or quack.

CHARLES'S-WAIN, in astronomy, seven remarkable stars in the constellation called ursa major, or the great bear.

CHARLOCK, the English name of a plant called by botanists, *rapistrum*, or *crambe*.

Charlock is a very troublesome weed in corn-fields, where we find two species of it very common, viz. one with a yellow flower, and the other with a white one. To prevent its growth the farmers mix horse dung with their cow dung used in manure, as the last is very apt to breed the charlock. When a field of barley is much infested with it, they mow it down in May, when in flower taking care only to cut it so low as just to take off the tops of the leaves of the barley.

CHARNEL-HOUSE, a place appropriated to the use of laying up the bones of the dead.

CHARRE, or GILT-CHARRE, a truttaceous fish, called by many *carpio*, and reckoned by Artedi a species.



species of salmon, less than a foot in length, with five rows of teeth in its palate.

*Red CHARRE* is likewise a species of salmon, called by authors *umbla minor*: it is much of the same size with the former, with the belly-fin red, and the under jaw a little longer than the upper one.

**CHART**, or **SEA-CHART**, a hydrographical map, or a projection of some part of the earth's superficies in plano, for the use of navigators.

*Plane CHART*, is a representation of some part of the superficies of the terraqueous globe, in which the meridians are supposed parallel to each other, the parallels of latitude at equal distances, and consequently the degrees of latitude and longitude every where equal to each other.

The equator is a right line drawn east and west on the chart.

Latitude on that part of the plane chart, is that part of the meridian intercepted between any parallel and the equator, and is either north or south, according as the parallel is situated on the north or south side of the equator.

Difference of latitude, is that part of the meridian contained between any two parallels of latitude.

Longitude on the plane chart, is counted on any parallel off from the first meridian.

Difference of longitude, meridional distance or departure, on the plane chart, are synonymous terms signifying the same thing, and are that part of a parallel of latitude intercepted between any two meridians.

The course between any two places on the plane chart, is the angle which the right line drawn through those places forms with their meridians. See the article *Plane SAILING*.

*Reduced CHART*, or *CHART of Reduction*, is that wherein the meridians are represented by right lines, inclining towards each other; these therefore, it appears by construction, must correct the errors of the plane charts. But since the parallels should cut the meridians at right angles, these charts are defective, inasmuch as they exhibit the parallels inclined to the meridians.

Hence another kind of reduced charts has been invented, wherein the meridians are parallel; but the degrees thereof unequal. These are called Mercator's charts.

*Mercator's CHART*, is that where the meridians are straight lines parallel to each other, and equidistant; the parallels are also straight lines, and parallel to each other; but the distance between increases from the equinoctial towards either pole, in the ratio of the secant of the latitude to the radius. If the superficies of a terrestrial globe be supposed to be taken off and extended on a plane, so as to make the meridians parallel to each other and the degrees of longitude every where equal; it is easy to conceive, that it must be productive of most notorious errors; for an island in the lat. 60 deg. where the radius of the parallel is equal to but one half of the radius of the equator, will have its length from east to west distorted in a double ratio to what it was on the globe; that is, its length from east to west, in comparison of its breadth from north to south, will be represented in a double proportion of what it really is. Whence it follows that, in whatever proportion the degrees of any parallel are increased or diminished by a projection in plano, the degrees of longitude ought to be increased or diminished in the same ratio; for otherwise the true bearings and distances of places will be lost, as in the case of the plane chart, where the degrees of latitude and longitude are all equal.

This Mr. Wright has elegantly effected, by keeping the meridians parallel as before, and protracting the degrees remote from the equator, in like proportion with those of longitude. This projection is generally, though very unjustly, called Mercator's projection; for Mr. Wright had long before invented it, though Mercator was the first who published it.

*Globular CHART*, a meridional projection, wherein the distance of the eye from the plane of the meridian, upon which the projection is made, is supposed to be equal to the sine of the angle of 45°. This projection

comes the nearest of all to the nature of the globe, because the meridians therein are placed at equal distances; the parallels also are nearly equidistant, and consequently the several parts of the earth have their proper proportion of magnitude, distance and situation, nearly the same as on the globe itself.

*Chorographick CHARTS*, descriptions of particular countries. See the article *CHOROGRAPHY*.

*Heliographick CHARTS*, descriptions of the body of the sun, and of the maculæ or spots observed in it.

*Selenographick CHARTS*, particular appearances of the spots, appearances, and maculæ.

**CHARTER**, in law, a written instrument, or evidence of things acted between one party and another.

*CHARTER of the King*, is an instrument signed by the king, for forming a body politick, or making a grant to some person, &c.

**CHARTER-LAND**, in law, is such land as a man holds by charter; that is, by deed, or evidence in writing; and is otherwise called freehold.

**CHARTER-PARTY**, is a written agreement between a merchant and the master or owners of a ship, relating to the freight. Of which there must be two copies; one signed by the master, and delivered to the merchant; the other signed by the merchant, and delivered to the master or owners. This agreement may be either for so much per month, or so much per ton; and the voyages may be either outward or inward, or both, or to several ports, called a trading voyage. Again, though commonly the master or owners victual and work the ship themselves, yet sometimes the merchant does it: and then the ship is said to be freighted for tear and wear; according to the circumstances, the form of the charter party will vary.

**CHARYBDIS**, a famous rock in the strait of Messina between Italy and Sicily, often mentioned in the writings of the ancient poets.

**CHASE**, a large quantity of ground lying open and privileged for wild beasts. It is larger than a park and smaller than a forest; it is not inclosed like the former, nor endowed with so many privileges as the latter.

**CHASE**, in maritime affairs, implies the ship chased or pursued.

*To give CHASE*, is to pursue a ship, &c. at sea.

**Stern-CHASE**, is when the chase is right a-head with the chaser.

*To lie with a Ship's Fore-Foot in the CHASE*, is to sail the nearest way to meet her, and so to cross her in her way, or to come across her fore-foot.

A ship is said to have a good forward or stern-chase, when she is built forward on, or a-stern, that she can carry many guns, to shoot right forwards or backwards.

*CHASE of a Gun*, is the whole bore of a piece of cannon.

**CHASE-GUNS**, those guns the ports of which are either in the head or in the stern. The former are useful in chasing others: the latter, when a ship is chased or pursued by another ship.

**CHASING**, in the sea-language, is the giving chase.

**CHASING of gold, silver, &c.** See **ENCHASING**.

**CHASTE-TREE**, *Agnus Castus*, in botany. See the article **AGNUS CASTUS**.

**CHATELS**, in law, a term which sprung originally to us from the Normans, who called all moveable goods by this name, the contrary was called fief, or, as we now call it, fee: but now, in our law, chattels are all sorts of goods, moveable and immoveable, except such as are in the nature of freehold, or a parcel thereof. They reckon chattels also to be either personal or real. The former are such as either do belong immediately to the person of a man, as his horse, sword, &c. or such things as, being injuriously withheld from him, a man hath no way to recover but by personal action. But chattels real do not appertain to the person, but to some other thing by way of dependence, as a box with charters of land, apples upon a tree, &c. such things also as necessarily issue of some immoveable thing to a person, as a lease or rent for years, they call a chattel real. Also to hold at will is a chattel real.

**CHAZINZARIANS**, in ecclesiastical history, a sect



of hereticks, who arose in Armenia in the seventh century, and adored the cross, which in that language is called chazus.

CHEASPEAK-BAY, a large frith or arm of the sea, which runs up about three hundred miles into the country between Virginia and Maryland, in North America: It is navigable almost all the way for large ships; being about twenty miles broad at the entrance between Charles-cape and Cape Henry, and between twenty and thirty miles broad afterwards.

CHECK, or CHECK-ROLL, a roll or book, wherein is contained the names of such persons as are attendant and in pay to the king, or other great personages, as the household servants.

*Clerk of the CHECK*, in the king's household, has the check and controulment of the yeomen of the guard, and all the ushers belonging to the royal family, allowing their absence or defects in attendance, or diminishing their wages for the same, &c. He also, by himself or deputy, takes the view of those who are to watch in the court, &c.

*Clerk of the CHECK*, is the name of an officer in his majesty's dock-yards. There is one allowed to every dock-yard in England, and in many places abroad, whose office is the same.

CHECKY, in heraldry, is where the shield, or part thereof, is a border, &c. is divided into chequers, or squares.

This is one of the most noble and ancient figures used in heraldry, and, according to Colombiere, ought never to be given, but to persons who have distinguished themselves in war.

CHEEK, in anatomy, that part of the face situated below the eyes, on each side. Wounds of the cheeks, if small, may be cured by the dry future; but if large, the bloody one must be used. See the article SUTURE.

CHEEKS, among mechanicks, are almost all those pieces of their machines and instruments, that are double, and perfectly alike; as the cheeks of a mortar, which are made of strong wooden planks, of a semicircular form, bound with thick plates of iron, and fixed to the bed with four bolts: these cheeks rise on each side the mortar, and serve to keep it at what elevation is given it: the cheeks of a printing-press are its two principal pieces, placed perpendicular and parallel to each other, and serving to sustain the three sommers, &c.

CHEEKS, in ship-building, two pieces of timber, fitted on each side of the mast, at the top, serving to strengthen the mast there, and having holes in them, called hounds, through which the ties run to hoist the yards.

Also the uppermost rail, or piece of timber in the beak of a ship, and those on each side of the trail-board, are called the upper and lower cheek.

The knees also which fasten the beak-head to the bows of a ship, are called cheeks.

CHEESE, a popular food; being a preparation of milk curdled by means of runnet, and afterwards dried and hardened.

Cheese is nothing but milk purged of its serum or whey; and sometimes too of the cream or butyrous part of the milk. Cheese, when new, is found to load the stomach, by reason of its moisture and viscosity; and when too old, it heats and inflames it by its salts. The physicians advise it to be eat in small quantities: hence that Latin verse,

*Casus ille bonus, quem dat avara manus.*

Dr. Quincy says, it cannot be too old: it is certain, the more it abounds with salts, the more it will contribute to digestion, and the clearing of the stomach of other food. Indeed some condemn all use of cheese; sheltering themselves under that ancient maxim,

*Casus est nequam, quia concoquit omnia se quam.*

CHEESE-Lip, a bag in which dairy women prepare and keep their runnet for making cheese.

CHELIDONIUM, celandine, in botany. See the article CELANDINE.

CHEMIN DES RONDES, in fortification, a space

between the rampart and low parapet under it, for the rounds to go about it.

CHEMISE, in fortification, the wall with which a bastion, or any other bulwark of earth, is lined for its greater support and strength: or it is the solidity of the wall from the talus to the stone-row.

*Fire-CHEMISE*, a piece of linen-cloth, steeped in a composition of oil of petrol, camphor, and other combustible matters, used at sea, to set fire to an enemy's vessel.

CHEREM, in Jewish antiquity, the second and greater sort of excommunication; by which the person on whom it is pronounced is deprived of almost all the advantages of civil society.

CHERRY-TREE, *Cerasus*, in botany, the name of a well known genus of trees, the flower of which is rosaceous, or composed of five roundish concave petals, arranged in a circular form. When the flower is decayed, the germen becomes a roundish or heart-shaped fleshy fruit, containing a roundish stone.

This genus is classed with the prunus or plum, by Linnaeus, but as they differ so much in the fruit, and are generally understood to be distinct genera, it was therefore in this work thought necessary to keep them separate.

The cherry-tree, it is said, is a native of Pontus, a province of Asia Minor, from whence it was brought into Italy by Lucullus, the Roman, Anno Rom. 680; and about one hundred years after was introduced into England, where there are various sorts cultivated at present, such as the Flemish-cherry, Kentish-cherry, May-duke, arch-duke, red-heart, white-heart, black-heart, amber-heart, ox heart, bleeding-heart, carnation, morello, and some others.

The black cherry is supposed to be a native of England, it being frequently found in the woods; it grows large, and the timber is used by turners and other artificers in wood. From this sort the black-coroon-cherry is supposed to have been produced.

Cherry-trees thrive best in a dry hazely loam. In a gravelly soil they are very subject to blights, and seldom stand long good.

The wood of the cherry-tree is of great use to cabinet-makers, chair-makers, &c. as it is very durable, not liable to split; and looks nearly as well as the ordinary sort of mahogany.

CHERRY-TREE with Double Flowers, is a species of the former, and propagated for the beauty of its flowers which are extremely fine. These are produced in large bunches, which renders the tree one of the most beautiful ornaments of a garden in the spring.

CHERRY-BRANDY, a strong liquor made of brandy, with the addition of black cherries.

A bottle being half filled with cherries, is filled up with brandy, and shaken several times: after standing a month it will be fit to drink.

CHERRY-WINE, a very cooling and pleasant drink, made from the juice of cherries properly fermented.

The chief care necessary in making it, is to let the cherries hang upon the trees till they are thoroughly ripe, by which means their juice, which they yield in great abundance, will be the better perfected and enriched by the sun; to gather them in dry weather; press out their juice, and add a quantity of sugar proportioned to the strength you desire in the wine; for the more sugar there is added to the natural juice of the cherries, the stronger and richer the wine will prove, when of a proper age. When this is done the whole must be regularly fermented.

CHERSONESUS, among geographers, the same with peninsula. See the article PENINSULA.

CHERT, among miners, implies a kind of flinty stone, found in thin strata in lime-stone quarries.

CHERUB, or CHERUBIM, a celestial spirit, placed next the seraphim in the hierarchy of heaven.

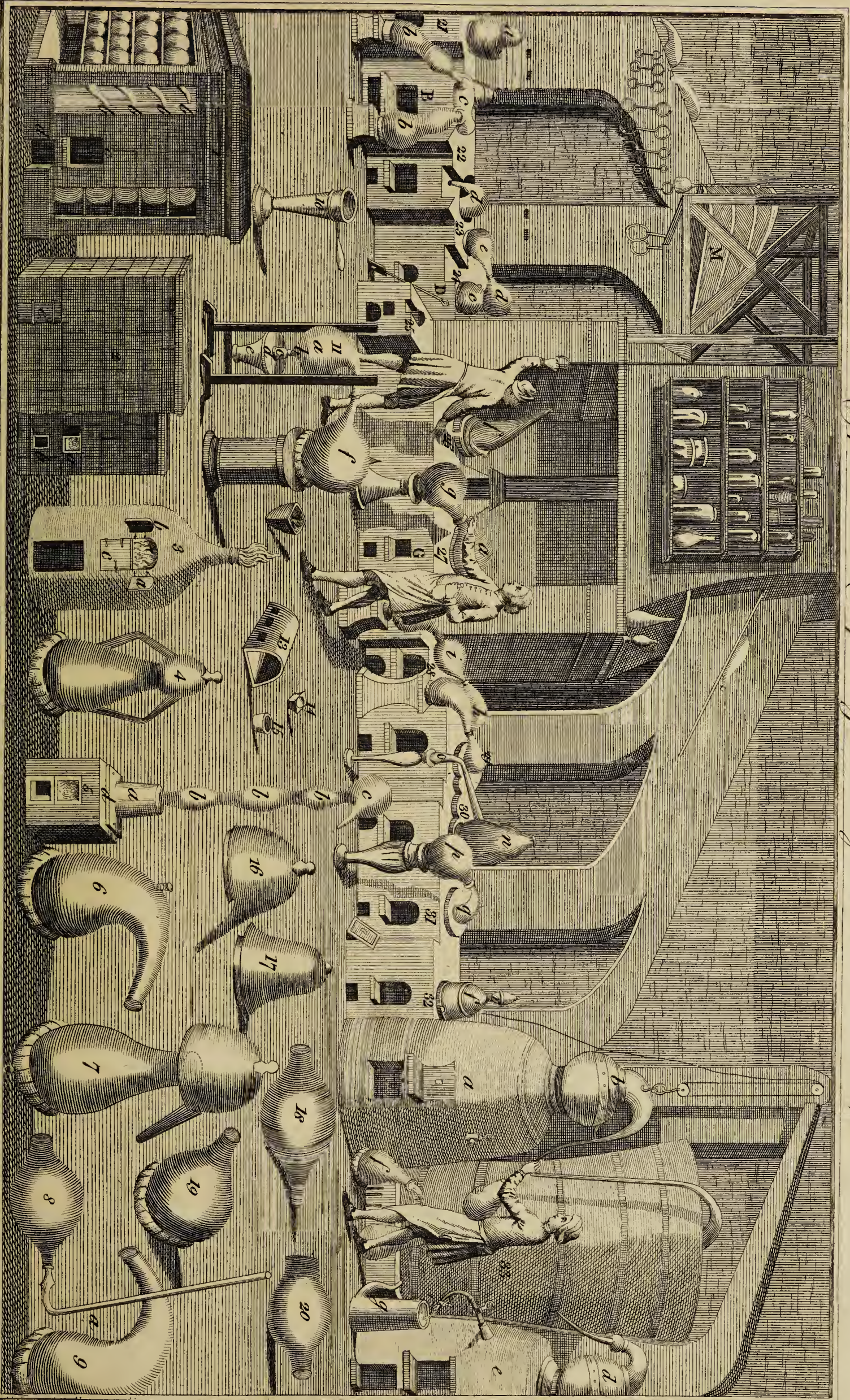
CHESNUT-TREE, *Castanea*, in botany. See CASTANEA, and BEECH *Fagus*.

CHEST, in commerce, an uncertain quantity of various commodities; as sugar, glass, castile-soap, indigo, oranges, &c.

CHEST, in anatomy, the cavity of the breast, or that part of the body which contains the heart, lungs, &c.

CHEST-











**CHEST-FOUNDER**, in farriery, a distemper incident to horses, and occasioned by an improper treatment in an inflammation between the ribs. For if the inflammation be not dispersed in time, and the viscid blood and juices so attenuated by internal medicines, that a free circulation is obtained, such a stiffness and inactivity will remain on those parts as will not easily be removed; and this stiffness is generally called chest-founder.

The signs of this inflammation, are a stiffness of the body, shoulders, and fore-legs; attended sometimes with a short dry cough, &c. a shrinking when handled in those parts.

Bleeding, soft pectorals, attenuants, and gentle purges, are the internal remedies; and externally the parts affected may be bathed with equal parts of spirit of sal ammoniac, and ointment of marshmallows, or oil of chamomile.

These outward inflammations frequently fall into the inside of the fore-leg, and sometimes near the shoulder; forming abscesses there, which terminate the disorder.

**CHEST-TREES**, in ship-building, small pieces of wood, bolted to the ship's sides. Each of these pieces is perforated with a hole, through which the rope called the tack is passed.

**CHEVALIER**, in the manage, is said of a horse when in passing upon a walk or a trot, his off fore-leg crosses or overlaps the near fore-leg every second motion.

**CHEVALIER**, in a general sense, signifies a knight, or horseman: but,

**CHEVALIER**, in heraldry, signifies any cavalier, or horseman, armed at all points, by the Romans called *cataphractus eques*, now out of use, and only to be seen in coat-armour.

**CHEVAUX DE FRISE**, in fortification, a large joist or piece of timber, about a foot in diameter, and ten or twelve in length; into the sides whereof are driven a great number of wooden pins, about six foot long, armed with iron points, and crossing one another, See *plate XX. fig. 7.*

The chief use of the chevaux de frise, is to stop up breaches, or to secure the avenues of a camp, from the inroads both of horse and foot. It is sometimes also mounted on wheels, with artificial fires, to roll down in an assault.

**CHEVRETTE**, in the art of war, an engine for raising of guns or mortars into their carriages.

It is made of two pieces of wood, about four feet long, standing upright upon a third square piece: the upright pieces are about a foot asunder and pierced with holes exactly opposite to each other, having an iron bolt, which being put through these holes higher or lower, at pleasure, serves with a hand-spike, which takes its poise over this bolt, to raise any thing by force.

**CHEVRON**, or **CHEVERON**, in heraldry, one of the honourable ordinaries of a shield, representing two rafters of an house, joined together as they ought to stand; it was anciently the form of the priestesses head attire: some say, it is a symbol of protection; others, of constancy; others, that it represents knight's spears, &c. It contains the fifth part of the field.

A chevron is said to be abased, when its point does not approach the head of the chief, nor reach further than the middle of the coat; mutilated, when it does not touch the extremes of the coat; cloven, when the upper pieces are taken off, so that the pieces only touch at one of the angles; broken, when one branch is separated into two pieces; couched, when the point is turned towards one side of the escutcheon; divided, when the branches are of several metals, or when metal is opposed to colour; inverted, when the point is turned towards the point of the coat, and its branches towards the chief.

*Per* **CHEVRON**, in heraldry, is when the field is divided only but by two single lines rising from the two base points, and meeting in the point above, as the chevron does.

**CHEVRONED**, is when the coat is filled with an equal number of chevrons, of colour and metal.

**CHEVRONEL**, a diminutive of chevron, and as such, only containing half a chevron.

**CHEVRONNE**, or **CHEVRONNY**, signifies the dividing of the shield several times chevron-wise.

**CHEWING-BALLS**, a kind of balls made of *asafoetida*, liver of antimony, bay-wood, juniper-wood, and pellitory of Spain; which being dried in the sun, and wrapped in a linen-cloth, are tied to the bit of the bridle for the horse to chew, they create an appetite; and it is said, that balls of Venice treacle may be used in the same manner with good success.

**CHIAN EARTH**, in pharmacy, one of the medicinal earths of the ancients, the name of which is preserved in the catalogues of the materia medica, but of which nothing more than the name has been known for many ages in the shops.

It is a very dense and compact earth, and is sent hither in small flat pieces from the island whose name it bears, and in which it is found in great plenty at this time. It stands recommended to us as an astringent. They tell us, it is the greatest of all cosmeticks, and that it gives a whiteness and smoothness to the skin, and prevents wrinkles, beyond any of the other substances that have been celebrated for the same purposes.

**CHICANE**, or **CHICANERY**, in law, an abuse of judiciary proceeding, tending to delay the cause, to puzzle the judge, or impose upon the parties.

**CHICANE**, in the schools, is applied to vain sophisms, distinctions and subtleties, which protract disputes and and obscure the truth.

**CHICK**, or **CHICKEN**, in zoology, denotes the young of the gallinaceous order of birds, especially the common hen.

**CHICKEN-POX**, and swine-pox, seem to be the small-pox in a less degree; though they sometimes precede, and sometimes succeed the small-pox. The pustules appear of the same kind, only in the swine-pox somewhat less than in the small-pox: these commonly appear five or six, sometimes twenty in the face, and but very few on the body. The patient is very little indisposed, either before, at, or after their appearance; though the sudden sinking of them often causes some disorder, but it is presently relieved by a little arrack and saffron, or a dose of treacle-water. Grown persons seldom keep within doors for either; and upon that account the eruptions may continue the longer, because the cold air is supposed to hinder their ripening; so that it is sometimes three weeks or a month before they totally disappear. These cases, being so very slight, seldom come under the care of a physician.

**CHICKLING-VETCH**, called by gardeners, the common everlasting pea, and by C. Bauhine, *Lathyrus Latifolius*, a perennial plant, growing naturally in many parts of England.

This plant as well deserving cultivation for the food of cattle, as the root, which will grow in almost any soil, yields every year a great burden of excellent provender.

We sowed, three years ago, a rood of land, light, and but poor in quality, with this seed: the work was done early in the spring, the land being prepared as for barley.

We sowed it not in the broad-cast way, as we should have found it much more difficult to keep down the weeds; but we caused a slight furrow to be drawn the length of the land, with a light plough; and when the seed was thinly sowed or rather dropped into this, another was drawn at a foot distance, in which the seed was dropped in the same manner.

An interval, or fallow space, was then left at least two feet wide; and then two more rows of the vetches, till the whole land was sown. We must observe that the seed was covered by means of a light harrow with wooden tines, drawn backward and forward across the land.

When the plants came up, we had them well hoed to clear the ground of weeds; and when they grew a little strong, they were set out with the hoe to about a foot distance in the rows, that they might have room to spread and branch.



The first year they yielded no great quantity of fodder, but they have since made us ample amends.

The second spring they came up very strong and vigorous, branching out much; and when we turned a couple of horses in to feed, they were very fond of it, eating it very greedily, though they were taken out of a good natural upland pasture.

The last summer the land was almost entirely covered, and it yielded a great deal of seed indeed: for experiment sake, we caused a few roods to be mowed just before it flowered, and it made good hay, sweet, and without being sticky.

We therefore think, from our little experience in the matter, we have some foundation for recommending this plant to the notice of the publick. We could wish indeed, we had been more accurate in our experiment; but what is past cannot be recalled: and some other person may, perhaps, hereafter give the publick more useful information on this head. *Museum Rusticum.*

CHIEF, in heraldry, implies the upper part of the escutcheon, extending entirely across from one side to the other.

CHIEF, is more particularly used to signify one of the eight honourable ordinaries in heraldry, containing a third part of the field, and determined by one line, either straight or crooked, that is inverted, engrailed, &c. down through the chief point of the escutcheon. Thus the field is gules, a chief argent. He beareth gules, a chief crenelle, or embattled argent.

Sometimes one chief is borne on another, which is called surmounting, and it is usually expressed by a line drawn along the upper side of the chief; for if the line be drawn along the lower part of the chief, it is called a fillet. The former of these is an addition, the latter a diminution of honour.

CHILBLAINS, are small red shining tumours appearing commonly on the fingers, toes, or heels, but not rising to any great height; when these tumors break upon the heels, they are termed kibes.

The cause of these tumours and inflammations appears to be cold, contracting the vessels where the circulation of the blood is but languid, upon which a stagnation ensues in the smaller canals; and the obstacle continuing, fresh blood arriving at the part, the vessels are gradually distended, and at length burst, which causes kibes.

These tumors seldom appear, except in the winter: on the fingers they come in lumps about the size of a silver penny, but sometimes less, and are generally red; though they afterwards turn livid, or blue, and then, breaking, they are called chaps in the hands; it is remarkable, that they seldom break upon the toes.

These tumors, though no danger attends, are painful and very troublesome; and in some persons the kibes continue all the winter.

It is usual to wash chilblains on the hands and toes with warm brine, urine, &c. but warm Hungary water and spirits of wine camphorated used with a sponge are much better. It seems very proper to let out the stagnated blood with a lancet, and afterwards to exhibit a cathartick or two: in the cure of kibes, nothing exceeds unguent. desiccatis rub. or diapamphol. mixed with a little camphire, and used for the dressings, with emp. de min. or diachyl. simp. let down with ol. rosor. to cover them.

CHILD, a term of relation to parent. We say, natural child, legitimate child, putative child, adoptive child, posthumous child, &c.

CHILIAID, a thousand of any species of things, ranged in several divisions, each of which contains that number.

CHILIASTS, in church history. See MILLE-NARIANS.

CHIMERA, a fabulous monster, represented by the poets, as having the head of a lion, the body of a goat, and the tail of a dragon.

CHIMERA, among philosophers, implies a mere creature of the imagination, composed of such contradictions and absurdities, as can exist no where but in thought.

CHIMES of a Clock, a kind of periodical musick,

produced at equal intervals of time by means of a particular apparatus added to a clock.

In order to calculate numbers for the chimes, and adapt the chime-barrel, it must be observed that the barrel must turn round in the same time that the tune it is to play requires in singing.

As for the chime-barrel, it may be made up of certain bars that run athwart it, with a convenient number of holes punched in them, to put in the pins that are to draw each hammer. By this means you may change the tune, without changing the barrel. In this case the pins or nut which draw the hammers, must hang down from the bar, some more, some less, and some standing upright in the bar; the reason whereof is, to play the time of the tune rightly.

For the distance of each of these bars may be a semibrief, &c. But the usual way is, to have the pins that draw the hammers fixed on the barrel. For the placing of which pins, you may proceed by way of changes on bells, viz. 1, 2, 3, 4, &c. or rather make use of the musical notes.

Where you must observe, what is the compass of your tune, or how many notes or bells there are from the highest to the lowest; and accordingly the barrel must be divided from end to end.

Thus, in the hundredth psalm, the tune is eight notes in compass, and accordingly the barrel is divided into eight parts. These divisions are struck round the barrel, opposite to which are the hammer tails.

Then you are to divide it round about into as many parts as there are musical bars, semibriefs, minims, &c.

The tune hath also twenty semibriefs, and each division of it is one; the first note of it also is a semibrief, and therefore on the chime-barrel must be a whole division, as may be understood by conceiving the surface of a chime-barrel to be represented as if the cylindrical superficies were stretched out at length, or extended on a plane; and then such a table so dotted or divided, if it were to be wrapped round the barrel, would shew the places where all the pins are to stand in the barrel: for the dots running about the table are the places where the pins must be inserted.

If you would have your chimes complete, you ought to have a set of bells to the gamut notes, so as that each bell having the true sound of sol, la, mi, fa, you may play any tune, with its flats and sharps, may even the bass and treble, with one barrel. And by setting the names of your bells at the head of any tune, you may transfer that tune to your chime-barrel, without any skill in musick: but observe, that each line in the musick is three notes distant, that is, there is a note between each line, as well as upon it.

We have given, (on plate XVIII.) a perspective view of a complete apparatus of this kind, where the number of musical bells are fifteen, each struck by its respective hammer. On the barrel are several pieces of musick, represented by the pins driven into the barrel at unequal distances from one another. This barrel, besides its circular motion, has another either forward or backward by means of the endless screw placed at one extremity of the apparatus, and by that contrivance a much longer piece of musick may be pricked upon the barrel than could otherwise be done. The hammers are represented as lying on the surfaces of the bells; but it must be observed that they do not touch the surface unless when their weight is increased by their fall, there being a spring under the tail of each to support it. It is sufficiently evident from the view on the above plate, how the hammers are lifted up by means of the pins inserted in the barrel.

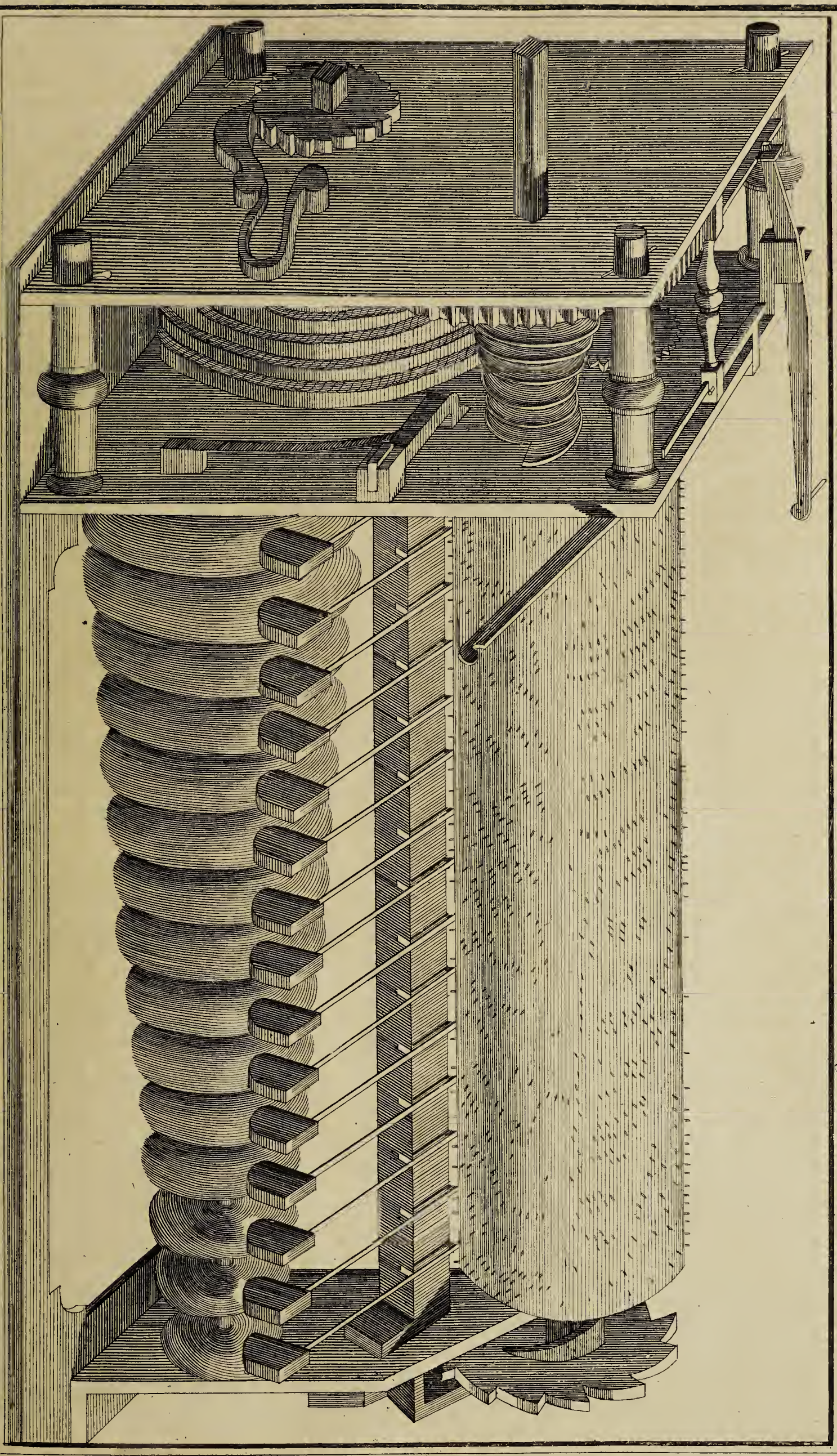
CHIMNEY, in architecture, a particular part of the house where the fire is made, being furnished with a funnel for carrying off the smoke.

CHIMNEY-JAMBS, imply the sides of a chimney, usually standing out perpendicularly from the back, and upon which the mantle-tree rests.

CHINA, or CHINA-WARE, a very beautiful species of pottery, generally called porcelain. See the article PORCELAIN.

CHINA-CHINA, a name given by some writers to the jesuit's bark. See the article QUINQUINA.











**CHINA ROOT**, in pharmacy, a medicinal root brought both from the E. and W. Indies, and distinguished into oriental and occidental, according to the different parts of the world from whence they are brought: their virtues are the same, only they are stronger in the oriental kind. There is no question of its being a sudorific and an attenuant, and therefore calculated to do great service by a continued use in many chronick cases. It has been given in decoction, and is usually combined with sarsaparilla and guaiacum; an ounce of it sliced thin is the usual proportion to a quart.

**CHIN-COUGH**, a convulsive kind of cough, which children are chiefly subject to, proceeding from a tough, viscid, and acid matter, lodged in the coats of the stomach, which when they vomit, they are easy for a time.

In the cure of this cough, particular care should be had to the stomach; and without a vomit the cure can hardly be effected. *Spermaceti* in broth is of an excellent use: but by bleedings and repeated purges this cough may be cured, without other means; yet the milder catharticks ought here to take place. Drinks and liquid aliments should also be taken in less quantity than usual.

**CHINE**, in the menage, the same with a horse's back-bone.

**CHINESE**, something belonging to the empire of China, or its inhabitants.

**CHINESE Philosophy**. The Chinese are universally allowed to have surpassed all other nations of India, in their antiquity, learning, politeness, the improvement of the sciences, a taste for philosophy, and their political principles. And, according to some eminent authors, they may dispute the pre-eminence, in these particulars, even with the politest nations in Europe.

**CHIONANTHUS**, or *SNOW-DROP-TREE*, in botany, a genus of the diandria-monogynia class. The calix is divided into four oval segments; and the drupa contains but one seed. There are two species, viz. the *virginica* and *zeylonica*, both natives of the Indies.

**CHIRAGRA**, in medicine, a term used to denote the gout in the hand or wrist.

**CHIROGRAPH**, *Chirographum*, in the time of the Saxons, signified any publick instrument of gift or conveyance, attested by the subscription and crosses of witnesses.

**CHIROGRAPH**, was also anciently used for a fine: the manner of engrossing the fines, and cutting the parchment in two pieces, is still retained in the chirographer's office.

**CHIROGRAPHER of Fines**, an officer in the Common Pleas, who ingrosses fines acknowledged in that court, into a perpetual record (after they are examined and passed by other officers) and writes and delivers the indentures thereof to the parties, one for the buyer and another for the seller. He makes a third indented piece, containing also the effect of the fine, which he delivers over to the *custos brevium*, and is called the foot of the fine. The chirographer also, or his deputy, proclaims all the fines in the court every term, according to the statutes, and then repairing to the office of the *custos brevium*, there endorses the proclamations on the backside of the foot thereof, keeping withal the writ of covenant, and also the note of the fine.

**CHIRURGERY**, or *SURGERY*. See *SURGERY*.

**CHISEL**, the name of a well-known tool used by carpenters, joiners, sculptors, &c.

**CHIVES**, or *CIVES*, among gardeners, the name of a very small sort of onions; formerly much used in sallads, but now little regarded.

**CHLORITES**, in natural history, a species of jasper, of a green colour.

**CHLOROSIS**, in medicine, a disease commonly called the green sickness, incident to girls, maids, widows, and even wives whose husbands are deficient.

Various are the symptoms of this disorder, as a feverish habit of body, vomiting, difficulty of breathing, and longing for unnatural foods.

As to the cure, Astruc recommends borax, mineral

waters, electuaries made of preparations of steel, the martial flowers, &c. *asafoetida*, aloes and myrrh, emollient baths, frequent evacuations, and exercise; but above all, matrimony.

**CHOCOLATE**, a kind of paste or cake, made of several ingredients, the basis of which is the cacao-nut. See *CACAO-NUT*.

**CHOIR**, that part of the church or cathedral where the choristers sing divine service.

**CHOIR**, in nunneries, is a large hall adjoining to the body of the church, separated by a grate, where the nuns sing the office.

**CHOLAGOGUES**, medicines which purge the bile. Of this kind are manna, cassia, roses, senna, rhubarb, aloes, jalap, scammony, &c. There is some reason to think that antimonial medicines act more powerfully on the bile than any other remedies.

**CHOLEDOCHUS**, in anatomy, is a common epithet for the gall-bladder, the hepatick vessels, and the common gall duct, which communicates with the duodenum.

**CHOLER**, or *BILE*. See the article *BILE*.

**CHOLERA-MORBUS**, in medicine, the same with bilious fever. See the article *Bilious FEVER*.

**CHONDROGLOSSUM**, in anatomy, the name of a pair of muscles arising from the cartilaginous processes of the os hyoides, and meeting in the base of the tongue, where they are inserted: this pair is not found in all subjects.

**CHOPIN**, or *CHOPINE*, a liquid measure, used both in Scotland and France, and equal to half their pint.

**CHORD**, in geometry, is a right-line connecting the extremities of any arch of a circle. Thus *LN* (*plate XVI. fig. 17.*) is the chord of the arch *LMN*.

*Line of CHORDS*, is the chords of a circle projected on a right-line. See *Plain SCALE*.

**CHORDS**, in musick, are the strings or lines, by the vibration of which all sounds are excited, and by the divisions of which the several degrees of a tune are determined.

The tone of a sound depends on the time or duration of the stroke made on the drum of the ear, by a wave or pulse of air; for as that is longer or shorter, the tone will be more grave or acute: and since all the pulses move equally swift, the duration of a stroke will be proportional to the interval between two successive pulses; and consequently a sound is more or less grave or acute, in proportion to the length of that interval.

Hence it follows that all the sounds from the loudest to the lowest, which are excited by the vibrations of the same body, are of one tone. It likewise follows, that all those bodies, whose parts perform their vibrations in the same or equal times, have the same tone; also, those bodies which vibrate slowest have the gravest and deepest tone; as those which vibrate quickest have the sharpest or shrillest tone.

The times of the vibrations of musical strings, and consequently the tones, vary in respect to the length, and magnitude, and the tension of those strings. For if two strings *AB*, *CD*, (*plate XVI. fig. 12.*) are of the same magnitude, and stretched by equal weights *E*, *F*, have their lengths as 2 to 1, the times of their vibrations will be in the same ratio. Hence the number of vibrations of the two strings *AB*, *CD*, performed in the same time, will be inversely as their lengths; or *CD* will make two vibrations, while *AB* performs one. The vibrations of two such strings will therefore coincide at every second of the lesser.

Again, if two strings of the same kind *AB*, *CD*, (*plate XVI. fig. 15.*) have their diameters as 2 to 1, and are of equal length, and extended by equal weights *E*, *F*, the times of the vibrations will be as their diameters, viz. as 2 to 1; and so the vibrations in a given time, and the coincidences, as before.

Lastly, if the diameters and lengths of the strings be equal, the times of the vibrations will be inversely as the square roots of the weights which stretch them. If the weights *E* and *F* be as 1 to 4 (the square roots of which are 1 and 2) then the times of vibration in *AB* and *CD* (*fig. 16.*) will be as 2 to 1. Hence in

H h h

con-



constructing stringed instruments, as spinnets, harpichords, &c. a skilful artist will compound these proportions of the length, diameter, and tension of the strings to very great advantage.

In wind instruments, as the flute, organ, &c. where the sound is made by the vibration of a column of elastic air contained in the tube, the time of vibration or tone of the instrument will also vary with the length and diameter of the said column of air, and force of the voice, which compresses it; as will be easy to observe from experiments.

If one body be made to sound with another, their vibrations will coincide after a certain interval; and the shorter the interval of the coincidence, the more agreeable is the effect or consonance to the ear; consequently, those which are most frequent produce the most perfect consonance or concord, as it is commonly called. When the times of vibration, therefore, are equal, the concord is most perfect and more agreeable than any other, and this is called unison.

If the times of vibration are as 1 to 2, the coincidence will be at every second vibration of the quickest; which therefore is the next perfect concord, and is what we commonly call a diapason, or octave.

If the times of the vibration be as 2 to 3, the coincidence will be at every third vibration of the quickest; which therefore is in the next degree of perfection, and this is called a diapente, or fifth. If the times of vibration are as 3 to 4, the coincidence will be at every fourth of the lesser; and this is called the diatessaron, or fourth. But this and the next which follow in order, are not so agreeable and pleasant to the judicious ear, and are therefore called imperfect concords.

CHORD, is also used by musicians to signify the note or tone to be touched or sounded.

CHORDAPSUS. See *ILIACK PASSION*.

CHORDEE, in medicine and surgery, a symptom frequently attending a gonorrhœa, consisting of a violent pain under the frænum, and along the duct of the urethra, during the erection of the penis, which is incurvated downwards. It has been found by experience, that rubbing a mercurial ointment into the part affected, and along the duct of the urethra, has been of considerable service in this complaint.

CHOREPISCOPUS, or *COUNTY-BISHOP*, an assistant to a bishop, first introduced into the church when the dioceses became enlarged by the conversion of the pagans in the country and villages at a distance from the mother church.

CHOREPISCOPUS, is also the name of a dignity in some cathedrals in Germany, signifying the same with chori-episcopus, or bishop of the choir. The first chanter in the church of Cologne is called chori-episcopus.

CHOREUS, in ancient poetry. See *TROCHEE*.

CHORIAMBUS, in ancient poetry, a foot consisting of four syllables, whereof the first and last are long, and the two middle ones are short.

CHORION, in anatomy, the exterior membrane which invests the foetus in the uterus.

CHOROGRAPHY, the art of making a map of some country or province.

Chorography differs from geography, as the description of a particular country does from that of the whole earth; and from topography, as the description of a country differs from that of a town or district.

CHOROIDES, in anatomy, one of the coats of the eye, placed immediately under the sclerotica. It is of a black colour, and full of vessels. Le Cat is of opinion this membrane, not the retina, is the immediate object of vision.

CHORUS, in the ancient dramatick poetry, is one or more persons present on the stage during the representation, who sung dythyrambick songs, during the intervals of the recitation.

CHORUS, in musick, is when the whole company join the singer, at certain periods of a song.

CHRISM, *χρῖσμα*, oil consecrated by the bishop, and used in the Romish and Greek churches in the administration of baptism, confirmation, ordination, and extreme unction.

CHRISM-PENCE, a tribute anciently paid to the bishop by the parish clergy for their chrism, consecrated at Easter for the ensuing year: this was afterwards condemned as simoniacal.

CHRIST, an appellation given to our Saviour, being of the same import with Messiah in the Hebrew.

CHRISTIANS, those who profess and practice the religion established by Jesus Christ.

CHRISTMAS, a festival celebrated on the twenty-fifth of December, in memory of the nativity of Christ.

CHROMATICK, in ancient musick, the second species of harmony, abounding in semi-tones.

CHRONICK, or *CHRONICAL*, among physicians, is an epithet applied to diseases that continue during a long interval of time.

CHRONICLE, a species of history disposed in chronological order, and nearly the same with what is generally called annals.

CHRONOGRAM, a species of false wit, consisting in this, that a certain date or epocha is expressed by numeral letters of one or more verses.

CHRONOLOGY, as it is commonly accepted, is the arithmetical computation of time for historical uses, that thereby the beginnings and endings of princes' reigns, the revolutions of empires and kingdoms, battles, sieges, or any other memorable events or actions may be truly stated.

Sturmius divides chronology into five distinct branches, viz. metaphysical, physical, political, historical, and ecclesiastical, according to the various relations or habitudes wherein time is considered, that is, as in itself, as connected and subjected to the affections, states, and alteration of natural things, as accommodated to civil uses, as matched with events that pass in the world, and particularly as it relates to the celebration of Easter.

CHRONOMETER, a general name for any instrument used in the measuring of time; in this sense clocks, watches, dials, &c. are chronometers: though there are some other instruments peculiarly called by that name, particularly one described in Dr. Desagulier's *Experimental Philosophy*; which is a kind of clock, contrived to measure small portions of time with great exactness, even to the sixteenth part of a second; which is of great use in astronomical observations, the time of the fall of bodies, the velocity of running waters, &c. But these kind of chronometers must not be depended on for any long space of time, except their pendulums be made to vibrate in a cycloid, because all clocks, which have short pendulums, are liable to err more considerably than those with long pendulums.

CHRYSALEIS, in natural history, a state of rest and seeming insensibility which butterflies, moths, and several other kinds of insects must pass through; before they arrive at their winged or more perfect state.

CHRYSANthemum, Corn-Marigold, in botany, a genus of plants, producing compound, radiated flowers; the proper hermaphrodite florets are funnel-shaped, and the female, ligulated, oblong, and tridentated; it is destitute of a pericarpium, but the immutated cup contains several solitary, oblong, naked seeds.

CHRYsolite, in natural history, a beautiful gem of a glittering splendor like gold, much valued by the ancients, and called topaz by the moderns. See the article *TOPAZ*.

CHURCH, a general name for the collective body of Christians dispersed through different parts of the world. Sometimes it signifies a particular congregation of Christians; and sometimes the place where they assemble for celebrating divine service.

CHURLE, CEORLE, or CARL, in the time of the Saxons, signified a tenant at will, who held land of the thanes on condition of rent and service. They were of two sorts, one like our farmers that rented the out-land estates, the other which tilled and manured the demesnes, and therefore called ploughmen.

CHYLE, in the animal œconomy, a milky fluid, secreted from the aliments by means of digestion.

The principles of the chyle seem to be sulphureous, mucilaginous, saline, and aqueous. It is a kind of natural



tural emulsion, both with regard to the colour, the ingredients, and the manner of preparation. There is this difference between the artificial and natural emulsion, that the latter is far more pure, and is prepared with much greater apparatus, not by the sudden expression of part of the liquid, but by a gentle and successive percolation.

The chyle is made sooner or later, according to the difference of the temperaments, strength, aliments and customs: therefore how many hours chylification requires, cannot be utterly determined. When the chyle enters the villous oscula of the lacteals, it is not a fluid extracted merely from the aliment and drink, but a mixture of several fluids; that is, the saliva and thinner mucus of the mouth, and the two fluids of the oesophagus, one proceeding from the villous membrane of the tube itself, the other from its glands. To these may be added the glutinous fluid of the stomach, the pancreatick juice, the fluid of Peyer's glands, which are very numerous in the small intestines. Hence the reason appears, why men may live upon bread and water, why the oriental nations use rice in the room of all kinds pulse, and why acids, spirituous liquors, saline things, and many vegetable juices, herbs, roots, acrid and aromack substances, are the least fit to generate chyle.

Some of the ancients supposed the chyle was changed into blood in the liver: others of them in the heart: but the moderns, with more reason, take the change to be effected by the blood itself, in all the parts of the body.

**CHYMICAL Laboratory, or Elabary, the place where chymical processes are performed.**

Explanation of plate XVII. representing a chymical laboratory.

1. A reverberatory furnace for distilling oil of vitriol, &c. with thirty-two long-necks.

*a, a, a, a*, the receivers, that are placed within the furnace, opposite to *b, b, b, b*, the necks of the long-necks, the bodies being placed with the furnace. *c*, the fire-place. *d*, the ash-hole.

2. A large furnace, in which flowers of sulphur are sublimed in a great quantity.

*a*, the fire-place. *b*, the ash-hole. *c*, a door into the body of the furnace, by which the flowers are taken out.

3. A melting furnace. *a, b*, two small doors to the fire-place, to be opened occasionally, when it is necessary to inspect the matter acted on by the fire, or to add fuel. *c*, a large door, to be opened when a crucible is to be set in or taken out of the furnace.

4. A pelican, or circulatory vessel.

5. A subliming furnace. *d*, the body of the furnace. *a*, the body into which the matter to be sublimed is projected. *b, b, b*, three aludels. *c*, the head.

6. A tubulated retort.

7. A body and head.

8. An adopter. *a*, a glass vent-tube fitted to its small end.

9. A retort.

10. A melter's horn, or antimonial cone.

11. A commodious apparatus for making spirit of sulphur. *a*, a large retort with a hole in its bottom. *f*, a tubulated receiver, with the spout upwards. *e*, a glass mortar. *d*, a concave glass plate, with a hole in the middle. *c*, a gallipot inverted over the perforation in *d*. *b*, a crucible containing burning sulphur.

12. A German crucible. 13. A muffle.

14. A black lead crucible.

15. A cupel or coppel.

16. An alembick head. 17. A blind head.

18. An adopter. 19. A receiver.

20. An earthen long-neck for distilling oil of vitriol, &c.

21. A furnace for digestions, &c. *a*, a vessel, containing the ingredients to be digested.

22. A furnace for distilling harts-horn in quantity. *B*, the furnace, containing an iron pot. *c*, an earthen head. *b, b*, two receivers.

23. A furnace for distilling with a retort on an open fire. *d*, a coated retort placed in the furnace.

24. A furnace for distilling in balneum mariae. *D*, the furnace, containing an iron pot filled with water. *c*, the

vessel, containing the ingredients placed in the water. *d*, a glass head. *e*, a receiver.

25. A small furnace for boiling syrups, &c.

26. A furnace for melting, boiling, &c. *M*, the bellows. *f*, a glass body in a copper vessel filled with water, placed over the furnace.

27. A furnace for making spirit of sal ammoniac, &c.

*G*, the furnace. *a*, a retort placed in the furnace. *g*, a large receiver.

28. An apparatus for procuring the volatile salt of sal armoniac, &c. in a dry form. *i*, an adopter. *b*, a receiver.

29. A sand-heat, with a retort and receiver.

30. A cold-still. *n*, the head. *o*, the receiver.

31. An open furnace for extracting volatile salts, as from vipers, &c. *q*, a coated retort placed in the furnace on an open fire. *p*, the receiver.

32. A furnace for digestions, tinctures, &c. *f*, a vessel, containing the ingredients to be digested. *r*, a blind head.

33. Two stills at work with one common refrigeratory. *a*, the body of the largest still. *b*, its head. *f*, the receiver. *e*, the body of the smallest still. *d*, its head. *g*, a spout receiver for separating oil from water.

**CHYMISTRY**, *χημια*, is an art that teaches us how to perform certain physical operations, by which bodies that are discernable by the senses, or that may be rendered so, and that are capable of being contained in vessels, may, by suitable instruments, be so changed, that particular determined effects may be thence produced, and the causes of these effects understood by the effects themselves, to the manifold improvement of various arts.

If we endeavour to find the origin of this art, we must look back into the antediluvian world, where it was practised, as some think, by Cham, the son of Noah; but the invention is more commonly ascribed to Tubal-Cain, who first prepared brass and iron for the use of man, which he could not have done without a competent knowledge of chymistry. Profane authors refer it to Vulcan; and several learned men have made it appear very probable that Tubal-Cain and Vulcan were the same, which seems to be confirmed by the great resemblance between their names. The next chymist we read of is Moses, whose skill in this art is evident from his burning and pulverizing the golden calf, and giving it the people to drink; for the rendering gold potable is one of the most difficult operations in chymistry: but some suppose that this was done by a miraculous power. The invention of chymistry is by others referred to Hermes Trismegistus, an ancient king of Egypt, from whom it has obtained the name of the Hermetick art. From the Arabians, by whom the art was esteemed and practised, it seems to have had the name of alchymy; but these people rendered it ridiculous by their extravagant superstitious reasonings, and their pretended transmutation of metals. And here it is to be observed, that chymistry at first had only metals for his object; whereas the bounds of it have been much enlarged in later ages, being extended to the animal and vegetable as well as the mineral kingdom; and the moderns have applied it with great success to the preparation of medicines for curing the diseases of the human body.

At the declension of the Eastern empire, chymistry shared the common fate of the other arts, and lay buried and neglected till the time of our friar Bacon, by whom it was in a great measure retrieved. He was followed by Raymund Lully, Basil Valentine, Paracelsus, Van Helmont, and others, who spread the art in Spain, Italy, and Germany; and the two last especially carried it to such a length, as to render medicine almost wholly chymical. Lemery a Frenchman, Homberg an E. Indian, and our ingenious countryman Mr. Boyle, dispersed the darkness of the art, reducing it to simple and true ideas, and abolishing those useless and impracticable circumstances, with which some of their predecessors had designedly clogged its operations. But of all the moderns none have made greater improvements in chymistry, or more judiciously and beneficially introduced it into medicine, than the late celebrated Boerhaave, who is also the fullest and best writer on the



the subject, having given us the history, theory, and practice of this noble art in an orderly and scientific manner.

**CIBOULS**, in botany, a small species of onion, but without any bulbs. They are cultivated in the same manner as onions. See the article **ONION**.

**CICATRICULA**, a name given by natural historians to the small whitish speck in the yolk of an egg, supposed to be the first rudiments of the future chick.

**CICATRIX**, in surgery, a small seam or elevation of callous flesh rising on the skin, and remaining there after the healing of a wound or ulcer.

**SWEET CICELY**, in botany, a plant with a perennial, long, thick, soft root, composed of many fibres of a sweet aromatick taste, from which arise many branching stalks, which grow to the height of four or five feet; these are downy and hollow. The leaves are large, and winged like those of the hemlock, but whiter; they are soft to the touch, a little downy, and have the smell of chervil. The flowers grow in umbels on the tops of the stalks, of a white colour, and a sweet aromatick scent; these appear in May or June, and are succeeded by long, angular, furrowed seeds, having the smell and taste of anniseeds, and are ripe in July.

This plant is reckoned a pectoral; and the leaves being dried in the shade, and smoaked like tobacco, is of great efficacy in asthmatick disorders. It is a native of Germany, but has been long cultivated in England. For its general characters, see the article **SCANDIX**, of which it is a species.

**CICER**, the chick-pea, in botany, an annual plant, with a slender fibrous root, from whence proceed several stalks; these are hairy, and furnished with conjugated leaves, each composed of seven or nine pair of lobes, serrated on their edges, and terminated by an odd one.

The seeds of this plant are accounted in some measure absterfive, and for that reason are met with in diuretick compositions in the officinal medicines: but they are very seldom found in other prescriptions. Chick-pease was the provision of the ancient Hebrews, when they took the field. They parched them, and so eat them; and at this day, in Egypt, it is usual for those who undertake a long journey, to lay in a good stock of chick-pease, parched in a frying-pan.

**CICHORIUM**, succory; in botany, a genus of plants, producing compound, plain, uniform flowers: the proper ones are monopetalous, ligulated, truncated, and deeply quinquidentated. The german is situated in a cylindrical calyx, which is connivent at the top, and contains solitary, compressed seeds with acute angles.

All the sorts of succory are esteemed aperitive and diuretick, opening obstructions of the liver, and good for the jaundice; it provokes urine, and cleanses the urinary passages of slimy humours. The juice taken in large quantities, so as to keep up a gentle diarrhæa, and continued for some weeks, has been found excellent against the scurvy and other chronical disorders.

**CICUTA**, hemlock, in botany, the name of a tall umbelliferous plant, with large leaves of a blackish green colour on the upper side, and a whitish green underneath, divided into a number of small oblong, and somewhat oval segments, which stand in pairs on the middle ribs. The stalk is round, smooth, hollow, irregularly variegated with spots of a reddish or blackish purple colour. The flowers are white, the seeds greenish, flat on one side, very convex and marked with five furrows on the other.

Hemlock is used externally in cataplasms, fomentations, and plaisters, as a powerful resolvent and discutient. Dr. Storch of Vienna has recommended the internal use of this plant as a powerful medicine in cancers, and most kind of ulcers; but from many experiments it has not been found to answer the character the doctor has given of it.

**CICUTA-AQUATICA**, long-leaved water hemlock, a poisonous plant greatly resembling smallage, growing in many meadows and watery places, and which have been too often fatally mistaken for it.

**CILIA**, the eye-lashes, in anatomy, those rigid hairs situated on the arch or tarsus of the eye-lids, and in-

dentented to moderate the influx of the light, and keep external bodies out of the eyes.

**CILIARE LIGAMENTUM**, in anatomy, a range of black fibres, circularly disposed, having their rise in the inner part of the uvea, and terminating in the prominent part of the chrystalline humour of the eye, which they surround.

**CILIARIS MUSCULUS**, in anatomy, that part of the orbicular muscle of the eyebrow which lies nearest the cilia.

**CIMEX**, BUG; in zoology, a genus of four-winged flies, of the order of the hemiptera, the characters of which are these: the rostrum or snout is inflected, or bent towards the breast; the wings are cruciated; the legs are formed for running; the back is plain, and the thorax marginated.

**CIMOLIA TERRA**, in natural history, a species of white marle, found in several parts of Europe. It is a ponderous substance, and makes a considerable effervescence with aqua-fortis.

**CINCTURE**, in architecture, a ring, or list at the top and bottom of the shaft of a column.

**CINERITIOUS**, an epithet applied to various substances that resemble cineres, or ashes, either in colour or consistence.

**CINNABAR**, in natural history, is either native or factitious. The native cinnabar is an ore of quick-silver, moderately compact, very heavy, and of an elegant striated red colour. In this ore the quick-silver is blended in different proportions with sulphur. It is so rich an ore, as to be no other than mercury impregnated with a small quantity of sulphur, just enough to reduce it to that state, being commonly more than six parts of mercury to one of sulphur; and even the poorest cinnabar-yields one half mercury: it is of a very bright, glittering appearance, when fresh broken; and is usually found lodged in a bluish, indurated clay; though sometimes in a greenish talcky stone.

*Factitious* **CINNABAR**, a mixture of mercury and sulphur sublimed, and thus reduced into a fine red glebe. The best is of a high colour, and full of fibres, like needles.

The receipt for making it, according to the late college dispensatory, is as follows: Take of purified quick-silver, twenty-five ounces; of sulphur, seven ounces; melt the sulphur, and stir the quick-silver into it while fluid; if it take fire, let it be immediately extinguished, by covering it with another vessel. When cold, let it be rubbed into a fine powder. Let this powder be put into a subliming vessel, and setting it over a gentle fire, raise it by degrees till the whole is sublimed into a red, striated, heavy mass, which perfectly resembles native cinnabar. This, as well as the native cinnabar, is excellent in epilepsies, and in all complaints of the head and nerves. But the factitious is rather to be preferred, as it doth not excite nauseas, vomitings, and other disorders which arise from vitriolick and perhaps arsenical particles blended by nature among some of the masses of the native mineral.

Cinnabar is likewise used by painters as a colour, and is rendered more beautiful, by grinding it with gum-water and a little saffron.

There is likewise a blue cinnabar, made by mixing two parts of sulphur with three of quick-silver and one of sal armoniack.

**CINNABAR of antimony**, a preparation of mercury, sulphur, and antimony, made by sublimation, said to be a good diaphoretick and alterative.

**CINNAMOMUM**, Cinnamon, a very agreeable aromatick spice brought from the E. Indies. See **CASSIA**.

*Oil of CINNAMON*, is distilled in the usual way of essential oil with water. What oil we have is usually distilled in the east, and brought over for sale in Europe: and the reason is very evident; for it is found that though cinnamon, when fresh taken from the tree, affords a very considerable quantity of oil, yet, when dried and kept some time, it yields less and less, and, after a few years, scarce any at all. In the distillation of this bark there are properly two kinds of oil separated; the one, which is of a very pale yellow, swims on the surface



surface of the water; but the other, of a redish colour, sinks to the bottom. They are both equally fragrant, acrid and pungent in the mouth *Hill*.

**CINNAMON WATER**, *Aqua Cinnamomi*. There are two sorts of cinnamon water, the strong and the simple.

Strong cinnamon water is made in the following manner: bruise a pound of choice cinnamon, and pour on it a gallon of proof-spirit; let it stand in digestion three days, shaking it from time to time; then pour it into a still, and with it a gallon of water, and draw off a gallon.

Simple cinnamon water, is made by digesting a pound of fine cinnamon grossly powdered in two gallons of water for twenty-four hours, and then drawing off a gallon by distillation.

**CINQUE-PORTS**, *Quinque-Ports*, five havens that lie on the east part of England towards France, so called, by way of eminence, on account of their superior importance; having been thought by our kings to merit a particular regard for their preservation against invasion. Hence they have a particular policy, and are governed by a keeper, with the title of lord-warden of the Cinque-ports.

**CION**, in gardening, a young shoot, twig, or sprout, put forth by a tree.

**CION**, in anatomy, is sometimes used to signify the uvula.

**CIPHER**, or **CYPHER**, one of the Arabick characters or figures used in computation; formed thus, 0.

A cipher of itself signifies nothing; but, when placed to the right of other characters in whole numbers, it augments their value ten times; and when placed to the left in decimal arithmetick, they lessen their value in the same proportion.

**CIPHER**, is also a kind of enigmattick character, composed of several letters interwoven; which are generally the initial letters of the person's names for whom the ciphers are intended.

**CIPHER**, is also applied to certain characters used for the writing of letters, which contain secrets of importance.

**CIRCENSIAN GAMES**, *Circenses Ludi*, a general term, under which were comprehended all combats exhibited in the Roman circus, in imitation of the olympick games in Greece.

**CIRCLE**, in geometry, a plane figure, comprehended under one single line, which returns into itself, having a point in the middle, from which all the lines drawn to its circumference are equal. Properly speaking it is the space included within the circumference, or periphery, that is in the circle; though in the popular use of the word, circle is frequently used for the periphery alone. Every circle is supposed to be divided into 360 equal parts called degrees, and every degree into 60 equal parts called minutes.

The circle is the most capacious of all figures, containing the greatest area under the least bounds.

The principal property of the circle is, that  $PM$  (*plate XVI. fig. 18.*) or the sine of the arch  $AM$  is a mean proportional betwixt  $AP$  or the versed sine, and  $PB$  the remaining part of the diameter; for the triangles  $APM$  and  $PMB$  being similar, their homologous sides are likewise similar, that is,  $AP:PM::PM:PB$ , which gives us the algebraick equation of the circle; for if  $AB=a$ ,  $AP=x$  and  $PM=y$ , then  $PB=a-x$ , and  $ax-x^2=y^2$ .

The method of finding the circumference of a circle from its diameter, or radius, being given, is one of the most useful problems in geometry. The ancient method of solving this noble proposition, was to find continually the sine of half the arch, which was performed in the following manner: the sine  $LP$  being given, the cosine  $OP$  and versed sine  $PN$  (*fig. 17.*) may be easily found; but  $LNq=LPq+PNq$ .

Wherefore,  $\sqrt{LPq+PNq}=LN=2QN=2LQ$ . Therefore half  $LN=QN=LQ$ . Now as the sine of 30 degrees=half the radius, the sine of 15 degrees is had by the foregoing equation; and by repeating the operation, the sine of 7 degrees 10 minutes may be found; and so on continually, till the sine of the arch

last found, its tangent, and, consequently, the arch itself, is expressed by the same decimal part of the radius. But as this method was attended with frequent involutions, and extractions of roots of very large numbers, the greatest mathematicians have endeavoured to find shorter and easier methods of obtaining the circle's periphery. The most direct and easiest method is by the help of the infinite series.

Let  $C$  be the centre of a circle (*plate XVI. fig. 20.*)  $CB=CA=r$ , the radius,  $AB=x$  any arch thereof,  $AD=y$ , its right sine then will be  $CD$ , its cosine  $=\sqrt{1-yy}$ :

Let  $CE$  be another radius of the circle infinitely near to  $CA$ , then will  $EG=y$  be the fluxion of the sine  $AD$ , and the infinitely small arch  $EA=x$ , the fluxion of the arch  $AB$ . And from the similarity of the triangles  $CAD$  and  $EAG$ , it will be as  $CD:CA::EG:EA$ ; that is in species  $\sqrt{1-yy}:1::y:x$ . This expanded into a series,

and multiplied by  $y$ , its fluent will be  $y+\frac{y^3}{6}+\frac{3y^5}{40}+\frac{5y^7}{112}+\frac{35y^9}{1152}+\frac{63y^{11}}{2816}$ , &c. the length of the arch  $AB$

Hence the length of any sine or ordinate in the circle being given, the corresponding arch may be easily found. If therefore the diameter of the circle be equal to 1. the circumference will be 3. 1415, 9265, 354+.

The impossibility of expressing the exact proportion of the diameter of a circle to its circumference, by any received way of notation; and the absolute necessity of having it as near a quadrature as possible; has put some of the most celebrated men in all ages upon endeavouring to approximate as near as may be to the truth. The first who attempted it with success, was the elaborate Van Ceulen, who, by the ancient method, though so very laborious, carried it to thirty-six decimal places, which he ordered to be engraven on his tomb-stone, thinking he had set bounds to further improvements. However, the indefatigable Mr. Abraham Sharp carried it to seventy-two places in decimals; and since that, the learned Mr. John Machin has carried it to one hundred places, and is as follows:

If the diameter of a circle be 1, the circumference will be 3. 14159, 26535, 89793, 23846, 26433, 83279, 50288, 41971, 69399, 37510, 58209, 74944, 59230, 78164, 05286, 20899, 86280, 34825, 34211, 70679, +, of the same parts; which is a degree of exactness far surpassing all imagination.

But the ratio's generally used in practice are as 7 to 22; as 106 to 333; as 113 to 355; as 1702 to 5347; as 1815 to 5702; or as 1 to 3. 14159.

Since, when the diameter of a circle is 1, the circumference will be 3. 14159, 26536—of the same parts, and since all circles are similar figures, it will be,

1. As 1, to 3. 14159, 26536—, so is the diameter of a circle, to its circumference. Wherefore, if the diameter of any circle be multiplied by 3. 14159, 26536—, the product will be the length of the circumference in the same parts.

2. As 3. 14159, 26536—to 1, or as 1, to .31830, 98862—, so is the circumference of a circle, to its diameter. Wherefore, if the circumference of any circle be divided by 3. 14159, 26536, or multiplied by its reciprocal .31830, 98862—, the former quotient, or the latter product, will give the diameter.

3. In the circle  $BE GH$  (*plate XVI. fig. 19.*) put  $BG=d$ ,  $OG=r$ , then will  $d=2r$ . Let  $A$  stand for the area, and  $c$  for the circumference, and suppose the arch  $FG=x$  to be infinitely small, then will  $\frac{r \cdot x}{2}$  be the area of the infinitely small sector  $OFG$ ; this, therefore, multiplied by the whole circumference  $c$ , that is, putting  $c$  in the room of  $x$ , we shall have  $\frac{r \cdot c}{2}=A$ , equal to the entire area of the circle.

4. Hence the area of any circle is found, by multiplying half the circumference by half the diameter or radius.

5. Hence every circle is equal to a triangle, whose base is equal to the circumference, and perpendicular height the radius.



6. Hence circles are to each other, as the squares of their respective diameters.

7. Hence, as 4 times the diameter to the circumference; so is the square of the diameter, to the area.

8. Hence circles are to each other, as the squares of their radii.

9. Hence, as the diameter of a circle is to its circumference, so is the square of the radius to the area. Wherefore,

As 1 to, 3.14159, 26536—, so is the square of the radius, to the area of the same circle.

10. Hence circles are to each other as the squares of their peripheries or circumferences.

11. Hence, as 4 times the circumference to the diameter, so is the square of the circumference to the area. that is,

As 12.56637, 06144—, to 1, or as 1 to .07957, 74715; so is the square of the periphery of any circle, to its area. Wherefore if the square of the periphery be divided by 12.56637, 06144—, or multiplied by .07957, 74715, the former quotient, or the latter product will give its content.

**CIRCLES of the Sphere**, are such as cut the mundane sphere, and have their periphery either on its moveable surface, or in another immoveable surface: the first revolve with its diurnal motion, as the meridians, &c. the latter do not revolve, as the equator, the ecliptick, &c.

If a sphere be cut in any manner, the plane of the section will be a circle, whose centre is in some diameter of the sphere. Hence the diameter of a circle passing through the centre, being equal to that of the circle which generated the sphere; and that of a circle which does not pass through the centre, being only equal to some chord of the generating circle; the diameter being the greatest of all chords, there arises another division of the circles of a sphere, into great and less.

**Great CIRCLE of the Sphere**, that which having its centre in the centre of the sphere, divides it into two equal hemispheres: such are the equator, ecliptick, horizon, the coloures, and the azimuths, &c. See the article **EQUATOR**, **ECLIPTICK**, &c.

**Lesser CIRCLE of the Sphere**, that which having its centre in some diameter of the sphere, divides it into two unequal parts: these are usually denominated from the great circles to which they are parallel, as parallels of the equator.

**Diurnal CIRCLES** are inmovable circles, supposed to be described by the several stars and other points of the heavens, in their diurnal rotation round the earth; or rather, in the rotation of the earth round its axis.

**CIRCLE of Curvature**, a circle, the curvature of which is equal to that of a certain curve at a given point.

**CIRCLE Equant**, in the old astronomy, a circle described on the centre of the equant, the principal use of which is to find the variation of the first inequality.

**CIRCLES of Excursion**, are parallel to the ecliptick, and usually fixed at ten degrees from it, that the excursions of the planets towards the poles of the ecliptick may be included within them.

All these circles of the sphere are conceived to fall perpendicularly on the surface of the globe, and so to trace out circle perfectly similar to them. Thus the terrestrial equator is a line precisely under the equinoctial in the heavens, and so of the rest.

**CIRCLES of Latitude**, or *Secondaries of the Ecliptick*, are great circles perpendicular to the plane of the ecliptick, passing through the poles of it, and through every star and planet. They serve to measure the latitude of the stars, which is an arch of one of those circles intercepted between the star and the ecliptick.

**CIRCLES of Longitude**, are several lesser circles parallel to the ecliptick, still diminishing in proportion as they recede from it: on these the longitude of the stars is reckoned.

**CIRCLES of Declination**, on the globe, are, with some writers, the meridians on which the declination or distance of any star from the equinoctial is measured.

**Horary CIRCLES**, in dialling, are the lines which shew the hours on dials, though these, in many sorts of dials, are right lines.

**CIRCLES of Position**, are circles passing through the

common intersections of the horizon and meridian, and through any degree of the ecliptick, or the centre of any star, or point of the heavens; and are of use in finding the situation or position of any star, &c.

**Logistical CIRCLE**, in logick, are when the same terms are proved *in orbem*, by the same terms and parts of the syllogism, alternately by each other, both directly and indirectly. This is a false method of reasoning, both because it supposes the principle it should prove, and afterwards proves the principle by the thing it seems to have proved.

**CIRCLE**, *Circulus*, among schoolmen, is understood of vicissitudes of generations arising one out of another: thus, vapours arise from moist grounds, rain is formed of vapours, and rain again moistens the ground. It is a celebrated dogma of the Scotists, that there is no circle in causes of the same order or kind.

**CIRCLES of the Empire**, such provinces and principalities of the empire as have a right to be present at diets. Maximilian I. divided the empire into six, and some years afterwards into ten circles. This last division was confirmed by Charles V. The circles, as they stand in the Imperial Matricula, are as follow: Austria, Burgundy, the Lower Rhine, Bavaria, Upper Saxony, Franconia, Swabia, Upper Rhine, Westphalia, and the Lower Saxony.

**CIRCUIT**, the journey or progress which the judges make twice every year through the several counties of England and Wales, to hold courts, and administer justice, where recourse cannot be had to the king's courts at Westminster.

**CIRCULAR**, something belonging to, or performed in a circle.

**CIRCULATION of the Blood**, the natural motion of that fluid in a living animal, whereby it is carried from the heart to every part of the body, and returned from thence to the heart by means of the veins.

The circulation of the blood was first discovered in England, in the year 1628, by Dr. Harvey, an ingenious and learned physician; though there are others who contend for the glory of this most important discovery. Leonicensus says, that Fran. Paoli Sarpi, a Venetian, discovered the circulation, but durst not publish his discovery for fear of the inquisition; that he therefore only communicated the secret to Fab. ab. Aquapendente, who, after his death, deposited the book he had composed on it, in the library of St. Mark, where it lay a long time, till Aquapendente discovered the secret to Harvey, who then studied under him at Padua, and who upon his return to England, a land of liberty, published it as his own. But Sir George Ent has shewn, that Father Paul received the first notion of the circulation of the blood from Harvey's book on that subject, which was carried to Venice by the ambassador of the republick at the court of England. But it is certain, Servetus had discovered it before them both.

The circulation of the blood was altogether unknown to the ancients: they thought that all the blood came from the liver, and that the greatest part of it passed into the vena cava, and so into all the branches belonging to it; but in such a manner, that, in coming out from the liver, a considerable quantity of it turns about, and enters into the right cavity of the heart, where it is divided into two parts, one of which runs through the vena arteriosa, into the lungs, and the other through the medium septum into the left cavity; where they say it is converted into arterial blood, or vital spirits, which is carried into the lungs by the arteria venosa, and all over the body by the arteria magna and its branches.

But it is now known that the veins discharge themselves into the ventricles of the heart; from hence all the arteries arise: the blood expelled out of the right ventricle must be carried, through the pulmonary artery, into the lungs; from which it must be returned, by the pulmonary veins, to the left ventricle; from the left ventricle the blood thus imported is, by the constriction of that part, again expelled into the aorta, and by it distributed all over the rest of the body, and thence is returned again to the right ventricle by the cava, which completes the circulation.

Thus



Thus far the great Dr. Harvey carried this interesting discovery; but there was still one thing wanting to complete his theory, namely, the knowledge how the veins received that blood which the arteries discharged. First, it was believed that the mouths of each sort of vessels joined into one another. That opinion was soon laid aside, because it was found, that the capillary vessels were so extremely small, that it was impossible, with the naked eye, to trace them. This put them upon imagining that the blood oozes out of the arteries, and is absorbed by the veins, whose small orifices receive it, as it lies in the fibres of the muscles, or in the parenchyma of the bowels; which opinion has been generally received by most anatomists since Dr. Harvey's time. But Leewenhoeck has lately found in several sorts of fishes, which were more manageable by his glasses than other animals, that the arteries and veins are really continued syphons, variously wound round each other towards their extremities, in numberless mazes over all the body: and others have found what he says to be very true, in a water newt; so that this discovery has passed uncontested. And since it has been constantly found, that nature follows the like methods in all sorts of animals, where she uses the same sorts of instruments, it will always be believed, that the blood circulates in men, after the same manner as it does in eels, perches, pikes, carps, bats, and some other creatures, in which Leewenhoeck tried it. Though the ways how it may be visible to the eye, in human bodies, have not, that I know of, been yet discovered.

**CIRCULATION of the Blood in Fœtus.** For this we must observe, that in the right auricle, on the lower side of the protuberance of the cava just opposite to the mouth of the cava ascendens, there is a hole called the *foramen ovale*, which opens into the vena pulmonaris. This hole has a valve, which suffers the blood to enter the vein, but hinders it to come back again. There is likewise a passage or canal which runs from the trunk of the pulmonary artery to the trunk of the aorta.

Now the blood which comes from the placenta, by the umbilical vein, into the vena portæ, is sent into the cava by a canal, which goes straight from the trunk of the portæ, to the trunk of the cava in the liver. This ascends the vena cava, and is directly thrown through the *foramen ovale* into the pulmonary vein, which carries it into the left ventricle, which throws it into the aorta, to be distributed through all the body. But the blood which comes down the vena cava descendens, is diverted by the isthmus of the cava, from the *foramen ovale*, and falls into the right ventricle, which thrusts it into the pulmonary artery, from whence part of it is immediately carried by the communicating canal into the aorta. The reason of these passages in a fœtus, was because the blood could not pass through the pulmonary blood-vessels, they being too much compressed by the substance of the lungs; but as soon as the child is born, and the pressure is taken off from the blood-vessels by the distention of the lungs with air, the blood, finding a free passage through the lungs, runs no more by the communicating canal, whose direction, likewise, is not so favourable for its reception as before; because the pulmonary artery being stretched out with the lungs, makes it go off at right angles, and therefore it dries up. And now the pulmonary veins being distended with the greater quantity of blood, which they receive from the lungs, the valve of the *foramen ovale* is pressed close to its sides, refusing a passage to the blood from the cava, to be mixed with the rest of the blood. By this we see, that the blood which comes from the vena cava descendens, passes only through the left ventricle, whilst the blood which comes from the vena cava ascendens passes only through the right ventricle. *Hoffman.*

**CIRCULATION of the Spirits, or nervous Juices.** The circulation of the spirits is evinced in the same manner as some authors choose to prove the circulation of the blood, viz. that the heart drives out, every hour, three or four thousand ounces of blood, whereas ordinarily there is not above two thousand in the whole body; there is a necessity for the blood, driven out, to return to the heart, in order to supply a fund to be expelled.

In like manner it is shewn, that there is formed, each hour, a large quantity of spirits, which are nothing but the more subtle parts of the blood, driven out from the brain; whence it is inferred that these too must circulate.

**CIRCULATION of the Sap of Vegetables,** is a natural motion of the nutritious juice of plants, from the root to the extreme parts, and thence back again to the root.

That there is a circulation in the bodies of vegetables seems to be evinced by the experiments of modern naturalists and gardeners, by means of certain vessels analogous to the veins and arteries in animals.

**CIRCULATION,** in chymistry, is an operation whereby the same vapours, raised by the action of the fire are condensed, and fall back again on the fluid, whence they arose.

**CIRCUMAMBIENT,** an epithet applied to any thing surrounding another, particularly to the air encompassing the earth.

**CIRCUMCISION,** in ecclesiastical history, the act of cutting off the prepuce, a ceremony still practised by the Jews and Mahometans.

**CIRCUMCISION,** is also the name of a festival, celebrated on the first of January, in commemoration of our Saviour's circumcision.

**CIRCUMFERENCE,** in geometry, the curve line which bounds the circle or any circular space.

**CIRCUMFERENTOR,** an instrument used by surveyors for taking angles.

It consists of a brass index and circle, all of a piece. The index is commonly about fourteen inches long, and an inch and a half broad; the diameter of the circle is about seven inches. On this circle is made a chart, whose meridian line answers to the middle of the breadth of the index, and is divided into three hundred and sixty degrees (see *plate XX. fig. 5.*) There is a brass ring foldered on the circumference of the circle, on which screws another ring, with a flat glass in it, so as to form a kind of box for the needle, suspended on the pivot in the centre of the circle. There are also two sights to screw on, and slide up and down the index; as also a spangle and socket screwed on the back-side of the circle for putting the head of the staff in.

*How to observe the Quantity of an Angle by the CIRCUMFERENTOR.*

Let it be required to find the quantity of the angle *EKG* (*plate XX. fig. 6.*) first, place your instrument at *K*, with the flower-de-luce of the chart towards you; then direct your sights to *E*, and observe what degrees are cut by the south-end of the needle, which let be 296; then, turning the instrument about, direct your sights to *G*, noting then also what degrees are cut by the south end of the needle, which suppose 247. This done, always subtract the lesser from the greater, as in this example, 247 from 296, the remainder is 49 degrees, which is the true quantity of the angle *EKG*.

**CIRCUMGYRATION,** the whirling motion of any body round a centre.

**CIRCUMLOCUTION,** a paraphractical method of describing any thing, or the saying any thing in many words, which might have been said in a few.

**CIRCUM-POLAR STARS,** a name given to those stars which do not set, but move round the pole without touching the horizon.

**CIRCUMSCRIBED,** in geometry, is said of a figure drawn round another, so that all its angles, sides or planes touch the inscribed figure.

**CIRCUMSTANCE,** some particularity that in some manner affects, though not essential to an action.

**CIRCUMVALLATION,** or *Line of CIRCUMVALLATION*, in the art of war, is a trench bordered with a parapet, thrown up quite round the besieger's camp, by way of security against any army that may attempt to relieve the place, as well as to prevent desertion.

This trench ought to be at the distance of cannon shot from the place: it is usually twelve feet broad, and seven deep; and at small distances is flanked with redoubts, and other small works, or with field forts, raised on the most proper eminences. It ought never



to be drawn at the foot of a rising ground, lest the enemy seizing on the eminence, should erect batteries of cannon there, and so command the line.

**CIRCUMVOLUTION**, in architecture, implies the torus of the spiral line in the Ionick volute.

**CIRCUS**, in antiquity, a very capacious building of a round or oval form, erected by the ancients for exhibiting shews to the people.

**CIRRI**, in botany, the fine strings or hairy filaments by which some plants as ivy, &c. fasten themselves to walls, trees, or other objects.

**CIRSOCELE**, in surgery, a preternatural distension, or divarication of the spermatick veins.

**CISLEU**, in the Hebrew chronology, the ninth month of the Jewish ecclesiastical, and the third of their civil year. It answers nearly to our November.

**CISSOID**, in the higher geometry, an algebraick curve, first invented by Diocles, an ancient Greek geometrician, whence it is peculiarly called the Cissoïd of Diocles: its chief use is for finding two mean proportionals between two given right lines; but Sir Isaac Newton, in his *Enumeratio linearum tertii Ordinis*, reckons it amongst one of the defective hyperbolas, being according to him the forty-second species. In his *Appendix de Equationum Construtione Lineari*, at the end of his *Arithmetica Universalis*, he gives the following elegant description of this curve.

Let A G be the diameter, and F the centre of a circle to which the cissoïd belongs (*plate XX. fig. 4.*) At the point F let the perpendicular F D be erected, and produced in infinitum; and let F G be produced to P, that F P may be equal to the diameter of the circle: let the rectangular ruler P E D be moved, so that the leg E P may always pass through the point P, and the other leg E D must be equal to the diameter A G, or F P, with its end D, always moving in the line F D; and the middle point C of this leg will describe the cissoïd G C K. To find the equation of this curve, draw C B perpendicular to F D, and let E C or C D =  $a$ , C B =  $y$ , F B =  $x$ , and on account of the similar triangles D B C, D E H, it will be B D ( $\sqrt{a^2 - y^2}$ ): B C + C D ( $y + a$ ) :: E D ( $2a$ ): E H + H D (F H + H D) or F D. Where-

fore  $\frac{2ay \times 2aa}{\sqrt{a^2 - y^2}} (=FD = FB + BD) = x + \sqrt{a^2 - y^2}$

Now by multiplying by  $\sqrt{a^2 - y^2}$ , there is made  $2ay + 2aa = a^2 - yy + x\sqrt{a^2 - y^2}$ , or  $2ay + aa + yy = x\sqrt{a^2 - y^2}$ , and by squaring the parts, divided by  $\sqrt{a + y}$ , and ordering them, there comes out  $y^3 + 3ay^2 + 3a^2y + x^2y + a^3 - ax^2 = 0$ .

If between any two quantities  $a$  and  $b$ , there be two mean proportionals to be found: Take A M =  $a$ , raise the perpendicular M N =  $b$ , join A N and move the ruler P E D until its point C fall upon the right line A N; then let fall C S perpendicular to A P, take  $t$  to S R and  $v$  to S P, as M N is to S C, and because A S, S R, S G, S C are continual proportionals,  $a, t, v, b$ , will also be continual proportionals.

**CISTERCIANS**, in ecclesiastical history, a religious order founded by St. Robert in the eleventh century. They wear a white robe in the manner of a cassock, a black scapulary and hood, and a woollen girdle. The nuns wear a white tunick, and black scapulary and girdle.

**CISTERN**, a reservoir for holding rain-water for the uses of a family. Some of the cities of Asia were formerly furnished with large subterraneous cisterns for saving the rain-water.

**CISTUS**, in botany, a genus of plants, the flower of which consists of five roundish, plain, patent, very large petals; the fruit is a roundish capsule, containing numerous small roundish seeds. This plant is of an inebriating quality; for which reason, in many places of Saxony, they boil it in their beer. They lay it also among clothes, to expel moths.

**Dwarf-Cistus**, in botany, the same with the helianthemum, or small sun flower.

**CITADEL**, a small place fortified with four, five, or six bastions, sometimes situated in and sometimes near the city.

**CITATION**, the same in ecclesiastical courts, as summons in the civil.

**CITHARA**, a stringed instrument of musick used by the ancients; but its structure is not precisely known:

**CITRINUS**, in natural history, a species of sprig crystal of a fine yellow colour, often set in rings, and mistaken for a topaz.

**CITRON-TREE**, *Citrus*, in botany, an ever green tree, with a slender trunk, the wood of which is white and hard, and the bark of a pale green colour. The leaves are somewhat like those of the orange, generally blunt, but now and then acuminate. The flowers, which grow on the tops of the branches, are like those of the orange, the petals being more fleshy. The fruit is in shape and size like the orange, but coloured like the lemon, and the juice higher flavoured and more of the perfume in it than either.

Citrons in Italy are not used as an aliment, but as a sauce, and are cut into small slices, as we do lemons, to garnish the dishes, and to squeeze upon the meat; the acid is very agreeable, excites a weak appetite, and helps digestion, when used moderately. It is an excellent remedy against the scurvy, and is a kind of specifick to cure that disease; when the gums of persons are ulcerated with this disorder, the juice will perfect a cure.

Citron-juice is also good in burning and malignant fevers, to quench thirst, and to restrain the heat and effervescence of the blood. When the juice is mixed with water, and sweetened with sugar, it makes a fine cooling drink, grateful to the palate. The juice of citrons is likewise diuretick, cleanses the kidneys of small gravel, and restrains vomiting proceeding from bilious humours. From the bark and flowers of this plant we have oils, essences, confections, and waters obtained, of which considerable quantities are imported.

The citron-tree is propagated and managed with us in the same manner as the orange-tree, but being of a more tender nature, there should be a flue in the green house where they are preserved, during the winter, in our climate.

**CIVET**, a soft unctuous odoriferous substance, about the consistence of honey or butter; of a whitish, yellowish, or brownish colour, and sometimes blackish, brought from the Brazils, the coast of Guinea, and the E. Indies: found in certain bags situated in the lower part of the belly of an animal of the cat kind. The bag has an aperture externally, by which the civet is shed or extracted.

This substance has a very fragrant smell, so strong as, when undiluted, to be disagreeable; and an unctuous subacid taste. It is used chiefly in perfumes, rarely or never for medicinal purposes, though the singular effects which musk has been lately found to produce may serve as an inducement to the trial. It unites with oils, both expressed and distilled, and with animal fats: in watery or spirituous liquors it does not dissolve, but both menstrua may be strongly impregnated with its odoriferous matter, water by distillation, and rectified spirit by digestion: by trituration with mucilages, it becomes soluble in water.

**CIVICK CROWN**, among the ancient Romans, was a crown given to any soldier who had saved the life of citizen. It was composed only of oaken boughs, but accounted more honourable than any other.

**CIVIL**, in a general sense, is something that regards the policy of a kingdom or state.

**CIVIL Law**, is properly the peculiar law, of each country, or state; but it generally implies a body of laws composed out of the best Roman and Grecian laws, compiled from the laws of nature and nations.

This is still used in our ecclesiastical courts, the admiralty, and the two universities; but restrained and directed by the common law.

**CIVIL Year**, the legal year, or annual account of time, which every government appoints to be used within its own dominions. So called to distinguish it from the natural year, which is measured by the motion of the heavenly bodies.

**CLAIM**, in law, a challenge of interest in, or right to a thing in the possession of another.

**CLAIR-OBSCURE**, or **CLARO-OBSCURO**. See the article **CLARO-OBSCURO**.

**CLAMP**, among brick-makers, implies a pile of bricks, built up for burning.

**CLAMPS**,



**CLAMPS**, in ship building, thick planks in a ship's side. Also small crooked plates of iron, forelocked over the trunnions of the cannon, to keep them steady in their carriages at sea.

**CLAMP-NAILS**, such nails as are used in fastening clamps in the building or repairing ships.

**CLAP**, in medicine, the same with gonorrhoea. See the article **GOONORRHOEA**.

**CLAR**, or **CLAER**, among assayers, the powder of bone ashes, kept for covering the inside of coppels.

**CLARENCIEUX**, the second king at arms, so called from the duke of Clarence, third son to king Edward III.

**CLARET**, a name given by the French to such of their red wines as are not of deep or high colour.

**CLARICHORD**, the name of a musical instrument resembling a spinet. It has forty-nine or fifty keys, and seventy strings.

**CLARIFICATION**, in chymistry, the act of clearing and finding any fluid from all heterogeneous matter or feculencies. This operation is performed either by decantation, by despumation, or by filtration.

The first and most simple manner of clarification, is by decantation. It is the separating fluids from their grosser parts, by means of the difference of their specific gravity, and is performed by only suffering the fluid to stand at rest, till every thing that will subside is collected at the bottom, and then pouring off from the sediment, by a gradual inclination of the vessel, all that part of the fluid which appears clear.

When fluids are to be freed from oils, or such matter as floats, an instrument, called a tritorium, or separating funnel, is to be used.

When oils, whose viscid consistence is apt to detain impurities, and prevent their subsiding, are to be clarified, it is proper, previous to decantation, to let them stand some time within a moderate digesting heat, by means of which, being more liquified, they will frequently let fall a sediment, not otherwise separable.

The second method, by despumation, is performed by adding whites of eggs, first well beat together, to the fluid to be clarified; and after a perfect commixture, making them coagulate by means of heat, and thereby carry to the surface all the heterogeneous matter, which is entangled by them in their coalescence; the impurities, together with the concreted whites of the eggs, appearing as a scum on the surface of the fluid, is to be taken off with a spoon.

The third manner, called filtration, or percolation, is performed by passing, without pressure, the fluid to be purified, through strainers of flannel, linen-cloth, or paper, which retaining the grosser parts, suffer only the clearer fluid to be transmitted.

When flannel is used, it is made into a bag, in the form of a cone, and then called Hippocrates's sleeve, the basis whereof being turned upwards, and expanded by means of three or four posts, from which it is made to hang: it is then filled with the fluid, which drops from the apex into a vessel.

This is mostly used in case of decoctions, extracts, and all gelatinous and saponaceous preparations, where extreme clearness is not necessary. In solutions of salts, spirits, and other limpid fluids, where great transparency is expected, paper, or decantation subsequent to it through flannel, are alone perfectly capable of answering the end. The manner of filtering through paper, is to put it into a tin or glass funnel, to whose form it is adapted in the manner of a lining. Linen-cloth is also used for this purpose, though but seldom, as it purifies with far less effect than woollen, unless in the solutions of gums and gummy extracts. In distilled waters, &c. which have a milky hue, or are turbid, clarification is generally effected with fine sugar, mixt with a small quantity of alum: fine and delicate wines are clarified with fish-glue, and thicker wines with omlet, &c.

**CLARIGATION**, *Clarigatio*, in Roman antiquity, a ceremony which always preceded a formal declaration of war, performed in this manner: the chief of the heralds went to the territory of the enemy, where, after some solemn, prefatory indication, he, with a loud

voice, intimated that he declared war against them for certain reasons specified, such as an injury done to the Roman allies, or the like.

**CLARION**, a kind of small trumpet, whose tone is acuter than that of the common trumpet.

**CLARO-OBSCURO**, or **CLAIR-OBSCURE**, in painting, the art of distributing the lights and shadows of a piece to advantage. It is also used to signify a piece consisting of two colours only.

**CLASPERS**, among gardeners are the same with what the botanists call Cirri. See **CIRRI**.

**CLASS**, a name given to the most general subdivisions of any thing.

**CLASS**, is also used in schools, as a synonyme for form, or a number of boys all learning the same thing.

**CLASSICK**, or **CLASSICAL**, an epithet applied to authors of the greatest authority; read in the classes at schools.

**CLAVICLES**, in anatomy, are two bones situated transversely, and a little obliquely to each other, at the superior and anterior part of the thorax, between the scapula and the sternum.

**CLAY**, *Argilla*, an unctuous and tenacious earth, accounted by husbandmen, the stiffest of all soils.

Clays are of different sorts, and of as different colours. One kind of them is so obstinate, that scarce any thing will subdue it; and another so hungry, as not to be satiated without uncommon pains, because it absorbs whatever is applied, and turns it to as bad a clay as itself. Some clays are fatter than others, some more slippery; all of them tenacious of water on the surface, where it stagnates, and chills the plants, without penetrating the soil; and in dry seasons they harden with the sun and wind, are very barren, and extremely untractable. The closeness of clay hinders plants from extending their roots to search for their necessary food, and prevents the entrance of water, which would help to convey it to them.

The more unctuous and fat clay frequently lies upon the other, and has often a bed of chalk beneath it: but neither is this worth any thing till loosened, and fitted to admit the influence of the sun, air, frost, &c. The blue, white, and red clay, if strong, are all unkind: the stony and looser sort is sometimes tolerable; and the light brick-earth does very well with most fruit-trees.

**CLEATS**, among seamen, are pieces of wood, having one or two projecting ends for fastening ropes. Some of these cleats are lashed to the shrouds, others nailed to different parts of a ship's sides, decks, or masts.

**CLECHE**, in heraldry, is a kind of a cross, charged with another cross of the same figure, but of the same colour of the field.

**CLEDGE**, among miners, signifies the upper stratum of fuller's earth.

**CLEFF**, or **CLIFF**, in musick, a mark placed at the beginning of the lines of a piece of musick, which determines the names of each line and space; according to the gamut. See the article **GAMUT**.

Formerly every line had a letter marked for a cleff; but now a letter or mark placed on one line is thought abundantly sufficient, since by this all the rest are readily known, by reckoning all the lines and spaces up and down in the order as the letters stand in the gamut. It is called cleff or key, because we thence know the names of all the other lines and spaces, and consequently the quantity of every degree or interval. But because every note in the octave is called a key, though in another sense, this mark or character is called the cleff.

By cleff therefore, for distinctions sake, we mean that letter or sign over a line which explains the rest; and by key, the principal note of a song, in which the melody closes.

**CLEMATIS**, virgin's bower, in botany, a genus of plants, the flower of which consists of four or five oblong lax petals: there is no pericarpium, but a small receptacle containing several roundish compressed seeds, crowned with a slender filament somewhat like a feather.

**CLEPSYDRA**, an instrument or machine serving to measure time by the fall of a certain quantity of water.



CLEPSYDRA, is also used to signify an hour-glass of sand.

CLERGY, *Clerus*, κληρῖς, a general name given to the body of ecclesiasticks of the Christian church, in contradiction to the laity.

The distinction of Christians into clergy and laity, was derived from the Jewish church, and adopted into the Christian by the apostles themselves: whenever any number of converts were made, as soon as they were capable of being formed into a congregation or church, a bishop or presbyter, with a deacon, were ordained to minister to them. Of the bishops, priests, and deacons, the clergy originally consisted; but in the third century, many inferior orders were appointed, as subservient to the office of deacon, such as subdeacons, acolythists, readers, &c.

CLERK, a word which originally signified a secular priest, in contradistinction to a religious or regular: but by degrees it came to signify any man of letters in general, and at last to every notary or writer.

CLIENT, among the ancient Romans, implied a citizen, who put himself under the protection of some great man.

CLIENT, at present, signifies a party engaged in a law-suit, who has entrusted his cause in the hands of an attorney or solicitor.

CLIMACTERICK YEAR, *Annus Climactericus*, a critical year in a person's life, in which he is supposed to be in great danger of ending his life.

The ancients however, were not agreed which were the proper climacterical years; some of them thought every seventh year to be climacterical, while others allowed only those years produced by the multiplication of 7, by the odd numbers 1, 3, 5, 7, and 9 to be critical. Therefore only 7, 21, 35, 49, and 63, were considered, according to the last hypothesis, as climacterical. The last, or 63, was called the grand climacterick.

CLIMATE, in geography, a space upon the surface of the terrestrial globe, contained between two parallels, and so far distant from each other, that the longest day in one differs half an hour from the longest day in the other parallel.

The difference of climates arises from the different inclination or obliquity of the sphere: the ancients took the parallel wherein the length of the longest day is twelve hours and three quarters, for the beginning of the first climate: as to those parts that are nearer to the equator than that parallel, they were not accounted to be in any climate, either because they may, in a loose and general sense, be considered as being in a right sphere, though strictly speaking, only the parts under the equator are so; or because they were thought to be uninhabited by reason of the heat, and were besides unknown. The ancients, considering the diversity there is in the rising and setting of the heavenly bodies, especially the sun, and, in consequence thereof, the difference in the length of the days and nights in different places, divided as much of the earth as was known to them, into climates; and instead of the method now in use, of setting down the latitude of places in degrees, they contented themselves with saying in what climate the place under consideration was situated. According to them, therefore, what they judged the habitable part of the northern hemisphere was divided into seven climates, to which the like number of southern ones corresponded.

A parallel is said to pass through the middle of a climate, when the longest day in that parallel differs a quarter of an hour from the longest day in either of the extreme parallels that bound the climate: this parallel does not divide the climate into two equal parts, but the part nearest to the equator is larger than the other, because the further we go from the equator, the less increase of latitude will be sufficient to increase the length of the longest day a quarter of an hour.

Some of the moderns reckon the different climates by the increase of half an hour in the length of the longest day, beginning at the equator, and going on till they come to the polar circle towards the pole: they then count the climates by the increase of a whole natural day, in the length of the longest day, till they come to

a parallel, under which the day is of the length of fifteen natural days, or half a month; from this parallel they proceed to reckon the climates by the increase of half or whole months, in the artificial day, till they come to the pole itself, under which the length of the day is six months. Those between the equator and the polar circles are called hour climates; and those between the polar circles and the poles, month climates.

Vulgarly the term climate is bestowed on any country or region differing from one another, either in respect of the seasons, the quality of the soil, or even the manners of the inhabitants, without any regard to the length of the longest day.

CLIMAX, or GRADATION, in rhetorick, a figure wherein the word or expression which ends the first member of a period begins the second, and so on; so that every member will make a distinct sentence, taking its rise from the next foregoing, till the argument and period be beautifully finished: or in the terms of the schools, it is when the word or expression, which was predicate in the first member of a period, is subject to a second, and so on, till the argument and period be brought to a noble conclusion; as in the following gradation of Dr. Tillotson. "After we have practised good actions a while, they become easy; and when they are easy, we begin to take pleasure in them; and when they please us, we do them frequently; and by frequency of acts, a thing grows into a habit; and confirmed habit is a second kind of nature, and so far as any thing is natural, so far it is necessary, and we can hardly do otherwise; nay, we do it many times, when we do not think of it."

CLINICK, a term applied by the ancient church-historians, to those who received baptism on their death bed.

CLINICK, in a modern sense, is seldom used but for a quack, or rather for an empirical nurse, who pretends to have learned the art of curing diseases by attending on the sick.

CLINICK MEDICINE, *Medicina Clinica*, was particularly used for the method of visiting and treating sick persons in bed, for the more exact discovery of all the symptoms of their disease.

CLINOIDES, in anatomy, are four small processes in the inside of the os sphenoides, forming a cavity called sella turcica, in the middle of that bone, in which lies the glandula pituitaria.

CLITORIS, or as some call it, *Mentula Muliebris*, in anatomy, a part of the external female pudendum, situated at the angle which the nymphæ form with each other.

CLOACA, in Roman antiquity, the common sewer, by which the filth of the city of Rome was carried away.

CLOACA, in comparative anatomy, imports the canal in birds, through which the egg descends from the ovary in its exit.

CLOCK, a kind of movement, or machine, serving to measure and strike time.

The usual chronometers are watches and clocks: the former in strictness are such as shew the parts of time; the latter, such as publish it by striking: though the name watch is ordinarily appropriated to pocket clocks; and that of clocks to larger machines, whether they strike or not.

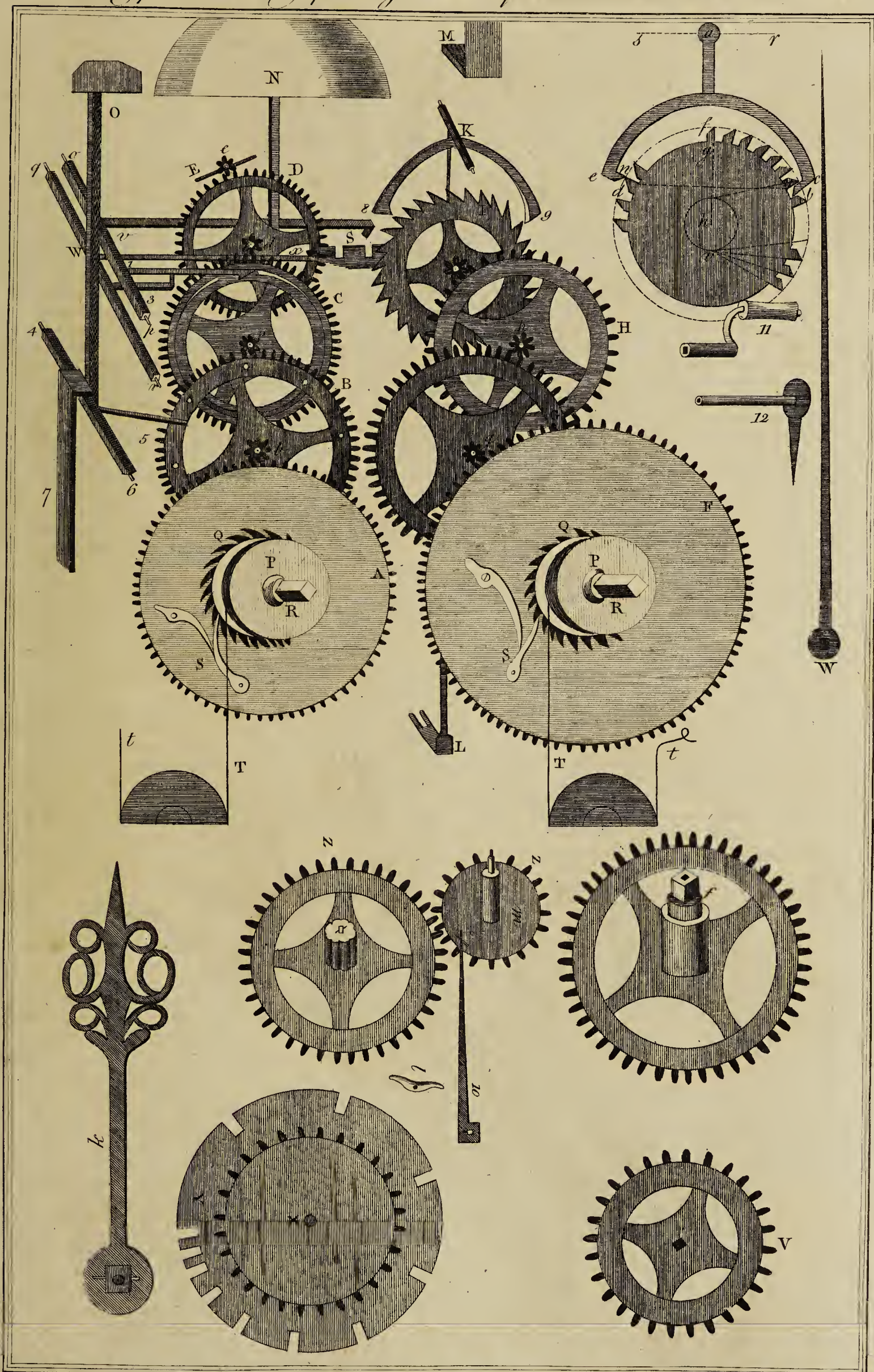
The invention of clock with wheels is referred to Pacificus, archdeacon of Verona, who lived in the time of Lotharius, son of Louis the Debonnair; on the credit of an epitaph quoted by Ughelli, and borrowed by him from Panvinus.

They were at first called nocturnal dials, to distinguish them from sun-dials, which shewed the hour by the sun's shadow. Others ascribe the invention to Boethius, about the year 510.

Mr. Derham makes clock-work of a much older standing; and ranks Archimedes's sphere, mentioned by Claudian, and that of Posidonius, mentioned by Cicero, among the machines of this kind; not that either their form or use were the same with those of ours, but that they had their motion from some hidden weights or springs, with wheels, or pulleys, or some such clock-work principle.

But











But be this as it will, it is certain the art of making clocks, such as are now in use, was either first invented, or at least retrieved, in Germany about 200 years ago.

The water-clocks, or clepsydræ, and sun-dials, have both a much better claim to antiquity. The French annals mention one of the former kind sent by Haroun al Rashid, the Caliph, to Charlemagne, about the year 807, which seemed to bear some resemblance to the modern clocks: it was of brass, and shewed the hours by twelve little balls of the same metal, which fell at the end of each hour, and in falling, struck a bell, and made it sound. There were also figures of twelve cavaliers, which at the end of each hour came forth at certain apertures, or windows, in the side of the clock, and shut them again, &c.

Among the modern clocks, the most eminent for their furniture, and the variety of their motions and figures, are those of Strasbourg and of Lyons. In the first, a cock claps his wings, and proclaims the hour; the angel opens a door, and salutes the virgin; and the Holy Spirit descends on her, &c. In the second, two horsemen encounter, and beat the hour on each other; a door opens, and there appears on the theatre the virgin, with Jesus Christ in her arms, the magi, with their retinue, marching in order, and presenting their gifts; two trumpeters sounding all the while to proclaim the procession. See Scottus; see also Salmasius on Solinus, Masius *de Tintinnabulis*, and Kircher in his *Museum Romanum*, and *Oedip. Ægypt.*

The invention of pendulum clocks is owing to the happy industry of the last age: the honour of it is disputed between Huygens and Galileo. The former, who has written a volume on the subject, declares it was first put in practice in the year 1657, and the description thereof printed in 1658. Becher, *De Nova Temporis Dimetiendi Theoria*, anno 1680, sticks for Galileo; and relates, though at second-hand, the whole history of the invention; adding, that one Tresler, clock-maker to the father of the then grand-duke of Tuscany, made the first pendulum-clock at Florence, by direction of Galileo Galilei; a pattern of which was brought into Holland.

The academy de'l Cimento say expressly, that the application of the pendulum to the movement of a clock was first proposed by Galileo, and first put in practice by his son Vincenzo Galilei, in 1649.

Be the inventor who he will, it is certain the invention never flourished till it came into Huygens's hands, who insists on it, that if ever Galileo thought of such a thing, he never brought it to any degree of perfection.

The first pendulum-clock made in England, is said to be by Mr. Fromantil, a Dutchman.

#### Principles and Calculation of CLOCK-WORK.

The work contained between the brass-plates of a clock A E K F (*plate XIX. fig. 1.*) is as follows: F the first or great wheel of 96 teeth; G the second wheel of 60 teeth, its pinion *g* of 8 leaves; H the third wheel of 56 teeth; its pinion *h* of 8 leaves; I the balance wheel of 30 teeth, its pinion *i* of 7 leaves; and K the balance. Likewise A the great wheel of 78 teeth; B the pin-wheel of 48 teeth, *b* its pinion of 8 leaves; C the hoop-wheel of 48 teeth, *c* its opinion of 8 leaves; D the warning-wheel of 48 teeth, and its pinion *d* of 6 leaves; E the fly, *e* its pinion of 6 leaves.

The ends R, R, of the arbors of the wheels A, F, come through the face of the clock, and these arbors are fixed in the barrels P, P, of 6 or 7 inches diameter; and on these barrels, the strings T t are wound, which go round two pullies with the weights that carry the wheels about. These two barrels are moveable round about within the wheels, but are kept from turning back by the catch S and its spring, and the racket-wheels Q fixed to the barrel. The weights are wound up by help of the winch or handle 11. In the rim of the wheel B are 8 pins, which, as the wheel goes round, thrust back the end *g* of the hammer O, and when it goes off the pin, the spring 7 makes the hammer O strike against the bell N.

The wheel C has a hoop upon its rim, which is cut away in one place, to let the end 1. of the detent

fall in. In the rim of the wheel D, there is a pin which stops against the end *x* of the arm W *x*, and hinders the wheels turning about.

On the axis *op* are fixed the two pieces *vs*, and the detent 12. On the axis *qr* are fixed two pieces W *x*, and the lifter 3; and on the end *r* of that axis which comes through the fore plate, is put the lifter 10, and pinned fast on.

The arbor of the wheel G comes through the face: upon this arbor, between the face and fore plate, is put the wheel *z* of 20 teeth, its arbor being hollow; and under the wheel is put the brass spring *l*, with the concave side upwards, this spring having a square hole in it, to fit the shoulder of the arbor of G. The wheel Z of 40 teeth turns upon a fixed pin or axis, and is driven by the wheel *z*. The dial-wheel *f* of 48 teeth, is put with its hollow socket upon the arbor or socket of *z*; then the face being put on, their ends come through it, and the hour-hand *k* is put upon the square end of *f*, and the minute-pointer W, upon the end of *z*, the wheel *z* being thrust down to bend the spring, and then a pin put in to keep it there; the pinion of *z*, called the pinion of report, has 8 teeth, and drives the wheel *f* and the hour-hand. Now the spring S keeps the wheel *z* pretty tight upon the axis of G, so that G will carry it about along with it; and if the minute-pointer be thrust about, it will force about the wheel *z*, and also Z, and likewise *f* with the hour-pointer.

The arbor of the wheel A goes through the back plate; upon it, behind the plate, is put the wheel V (or pinion of report) of 18 teeth, and pinned there. The double wheel X Y is carried by V, and turns upon a pin fixed on the back of the plate. The wheel X has also 28 teeth, and the count-wheel Y is divided into 11 parts of unequal lengths; according to the strokes the clock is to strike at every hour, the part of this wheel is represented at S. A slender spring is put on with this wheel to keep it tight. This part may be made more simple, by leaving out the wheels V, X, and putting Y upon the axis of A instead of V, but it must be put on the contrary way.

The arbor of the balance-wheel I, comes through the fore plate, almost to the face, and through a hole in the face is put the hollow socket of the second pointer 12; and this shews the seconds by a small circle divided into 60 parts: and the face is also divided into two circles, shewing hours and minutes.

The pendulum hangs on the fixed piece of brass M, by a button at top, and a thin piece of brass going into a slit at M; and a flat piece of brass goes into the fork L, so that if the pendulum moves, it must move the rod K E, and balance K along with it.

The pallats 8, 9, of the balance K, are so formed, that the under-side of 8, and the upper-side of 9, where the teeth of the wheel I act, are polished planes, and made sloping; so that a tooth sliding along the under-side of the pallat 8, will force the balance K to the left hand, and a tooth sliding along the upper-side of the pallat 9, will force it to the right.

The work is put together, by setting the teeth together that are marked in the wheel B, and in the pinion *c*, and likewise in the wheel C, and pinion *d*. Then the minute-hand or pointer is put on the arbor of *z*, mark to mark; and the hour-pointer the same way on the arbor of *f*; and the wheels *z*, Z, *f*, are set to one another according to their marks.

The weights hanging upon the wheels A, F, and the pendulum made to vibrate, the wheel F drives G, which drives H, which drives I; then whilst the pendulum vibrates to the right, a tooth slips off the pallat 9, and in its return to the left a tooth slips of the pallat 8; then on the right another goes off 9, and so on alternately; and the weight causing the teeth to act against the pallats of the balance, keeps the pendulum in motion, and the wheel I goes round once in a minute.

As the wheel G goes round, it carries about *z*, with the minute-pointer, once round in an hour, *z* drives Z, which drives *f* once round in 12 hours. Whilst the wheel *z* goes round, the pin *m* raises the lifter 10, which lifts up the piece 3, and the arm W *x*; the piece 3 raises the detent 12, together with *vs*; the end 2 of the



the detent being raised above the hoop, the wheel C move about, and by the oblique figure of the end of the detent 2, it raises the end of the detent higher, and also raises S out of the notch of the count-wheel. Then the wheel D turns round, till the pin in the rim stops at the end x, which hinders the motion. But as the wheel z goes further about, the lifter 10 falls down off the pin, together with the piece Wx, and latch 3, which suffers the wheel D, and the rest to turn round, and the pin which causes the hammer to strike so often, till the end S falls into a notch of the count-wheel; and then the detent 1 falls into the vacancy in the hoop, and locks the work; which continues so till the next hour, that the piece 10 is raised again, and the clock strikes as before: the wheel C goes round every stroke of the clock; but it strikes one more every succeeding hour, because the teeth between the notches are made longer and longer in the count-wheel, and it turns round once in 12 hours.

In the striking part of the clock, the pin-wheel being divided by the pinion of the hoop-wheel, the quotient shews the number of pins in the pin-wheel. If 78 be divided by the number of pins, the quotient shews the revolutions that the pin-wheel makes for one revolution of the count-wheel.

The hoop-wheel, divided by the pinion of the warning-wheel, must be a whole number.

In the motion part, the train is the number of beats the clock makes in an hour, which is 3600 for seconds: in this case the balance-wheel must have 30 teeth.

If G turns round once in an hour and shews minutes, then the quotient of G divided by the pinion of H, multiplied by the quotient of H, divided by the pinion of I, and that multiplied by twice the teeth in I, must be equal to the train. And if the clock beats seconds, then the product of the two quotients must be 60.

If G shews the hours, then the quotient of f divided by the pinion of Z, multiplied by the quotient of Z divided by z, must be 12.

From the great wheel to the ballance, the wheels drive the pinions; but to the dial-wheel, the pinions drive the wheels: the former increases the motion; the latter lessens it.

Any wheel being divided by the pinion that works in it, shews how many turns that pinion hath to one turn of the wheel: as if the pinion be 5; and the wheel 60, it is set down thus,

5) 60 (12 times. Or thus  $\frac{60}{5} = 12$  times.

The teeth of several wheels and pinions that work in one another, are set down thus:

4) 36 (9 times

8) 80 (10 times;

6) 54 (9 times

5) 40 (8 times

Or thus  $\frac{36}{4} \times \frac{80}{8} \times \frac{54}{6} \times \frac{40}{5}$

In the former way, the number on the left hand of any wheel is the pinion that it drives; and the number over it is the pinion on the same axis. In the latter way, the several fractional quantities represent the quotients.

Any wheel and the pinion it drives, will have the same motion with another wheel and pinion, when their quotients are equal. Thus a wheel of 36 drives a pinion of 4, just the same as a wheel of 45 does a pinion of 5; or a wheel of 90 a pinion of 10. In any motion we may say one wheel and one pinion, or else several wheels and several pinions, provided they all give the same motion: therefore, when a number is too big to be cut in one wheel, it may be divided into two or more quotients.

In a wheel and pinion that work in one another, their diameters must be as the number of teeth in each: and the diameter must be measured, not to the extremity, but to the middle of the tooth, or where they act.

The excellency of clock-work consists in forming the teeth truly, and to fit the notches exactly without shaking, and to play freely.

The pallets 8, 9, are here formed by the common method; a better way of forming them is thus: from the centre of motion a describe two small arches bc and

de; these small lines or planes bc and de, and also the working side of the tooth fg, must all range to b, the centre of the balance-wheel. And the ends of the pallets by, and de, must range a little to the right hand of the centre a; then the teeth of the ballance-wheel will fall alternately on the sides bc, and de; and any tooth, whilst it acts against bc, or de, will have no effect in moving the pendulum; but remains without motion till it makes its escape off the angle b, or d; and then in moving along the plane by, or dn, it forces the pendulum to the right or left.

But the construction may be improved thus: take as, ar, each equal to  $\frac{1}{3} bd$ . From the centre s, describe the arches bc, de, and let the ends by, dn, range to r. Or it will be the same thing to describe bc, and de, from the centre a; and let the acting side of the tooth range to v, the outside of the circle described with the radius vb =  $\frac{1}{3} fb$ .

CLOISTER, a habitation surrounded with walls, and inhabited by religious.

CLOSE Behind, in the manege, a horse whose hoofs come too close together: such horses are commonly good ones.

CLOSE-HAULED, in the sea-language, a certain situation of disposing the sails of a ship to make a progress in the nearest direction possible to the point from which the wind bloweth, or to the direction of the wind (see the next article). A ship commonly sails at this time within about six points of it; but sloops and other small vessels will frequently go almost a point higher, and all vessels are supposed when close-hauled to make nearly a point of lee-way, even when they have the advantage of a good sailing breeze and smooth water: lee-way always increases in proportion to the rising of the wind and sea. Lee-way is known to be an angle included between a ship's real and apparent progress; as a ship having the wind at north, and being close-hauled, she will stem ENE one way, and WNW the other; but as she will make a point of lee-way, her course will be only E by N one way, and W by N the other.

Close-hauling, therefore, is arranging the sails sideways; so that the wind, as it crosses the ship obliquely from forward towards the stern, may fill them; but as the wind likewise enters the cavities of the sails in an oblique direction, its force is considerably diminished in giving head-way, and therefore the ship makes the least progress when sailing in this manner, at which time the lower corners of the sails are stretched fore and aft, or lengthways; and the weather or windward-edges of all such as are fixed upon yards, are drawn tight forward by ropes called bow-lines, which are fastened up and down in three or four places to keep the sail steady. See BOWLING.

CLOSE-QUARTERS, in naval affairs, certain strong thick fences of wood stretching across a merchant-ship in several places: they are used as a place of retreat when a ship is boarded by her enemy, and are therefore fitted with several small musket holes, from which the ship's crew can defend themselves and annoy the enemy: they are likewise fortified with several small caissons called powder-chests, which are fixed upon the deck filled with powder, and can be fired at any time from the close-quarters upon the boarders. See the article BOARDING.

"When the enemy is determined to board, it will be most expedient to keep firing your blunderbusses out of the look-holes in the quarter, among his men, as they stand thick to enter: as soon as he is aboard, spring your powder-chests upon the quarter; for then his men in mounting your quarter will be numerous: let your men in the round-house be ready to give the enemy a volley with their small arms, as soon as they come upon your quarter-deck; those who are quartered in the fore-castle must keep a watchful eye on the poop that they do no mischief there, and likewise fire at them as they mount the shrouds.

"If the enemy come in numbers upon the quarter-deck, discharge your cannon from the round-house with case-shot at them, and if a breach is expected before they are re-loaded, toss out hand-grenadoes amongst them; then spring your powder-chests as the last remedy;



medy; for it is prudence in a commander to let these stand as long as possible, because they not only strike a terror into the enemy, but are, at all times ready; and so long as they are standing he will conclude you are in no great extremity.

“From all places have an eye to your rigging, that the enemy do not cut the sails loose; and be sure to aim at the leading men: having sprung your powder-chests upon the sides, after the enemy is aboard, turn all hands to the bulk-heads in readiness to receive the first attack, which will be the briskest; for being side by side, his men will enter upon the fore-castle, main-deck, and quarter-deck: if all this while the master be exemplary brave, and the men fire with discretion, they will soon make the crew of a considerable ship leave so hot a place, as this must consequently be, &c. *Capt. Park's Defensive War by Sea.*

CLOTH, in commerce, implies all kinds of stuff wove in a loom, whether composed of wool, hemp, flax, &c. but is generally used to imply woollen cloth. See the article WOOLLEN MANUFACTURE.

CLOUD, a collection of vapours suspended in the atmosphere.

CLOVE. See the article CARYOPHYLLUS.

CLOVER, the name of a well known plant, and of which there are a great variety of species; but only three of them cultivated in the open fields for the food of cattle, viz. the red Dutch clover; the white Dutch clover; and the hop-clover.

The first sort is sufficiently known in England by the name of red clover, and therefore needs no description. It is called by Linnæus, *Trifolium caule erecto, foliolis oblongo-ovatis integerrimis, spicis ovatis, calycibus setaceis.*

Since red clover has been cultivated in England, great improvements have been made in clay lands, which before produced little except rye-grass, and other coarse bents; but, being sown with red clover, have produced more than six times the quantity of fodder they formerly did: whereby the farmers have been enabled to feed a much greater stock of cattle, than they could do before, with the same extent of ground, which has, at the same time, enriched the soil, and prepared it for corn; and hence it is now common, where the land is kept in tillage, to lay down their ground with clover, after having had two crops of corn, whereby there is a constant rotation of wheat, barley, clover, or turnips, on the same land. The clover-feed is generally sown with the barley in the spring; and when the barley is taken off, the clover spreads and covers the ground; and this remains two years, after which the land is ploughed again for corn.

The second sort, namely, the white Dutch clover, grows naturally in most of the pastures in England, and is generally known among the country people, by the name of white honey-suckle. Linnæus calls it, *Trifolium capitulis umbellariis, leguminibus tetraspermis, caule repente.*

This is an abiding plant, whose branches trail upon the ground, and send out roots from every joint, so that it thickens and makes the closest sward of any of the sown grasses; and it is the sweetest feed for all sorts of cattle yet known: therefore when land is designed to be laid down for pasture, with intent to continue so, it should be sown with the seeds of this plant.

The third sort, namely hop-clover, called by some yellow meadow trefoil, and by botanists, *Trifolium spicis ovalibus imbricatis, vexillis deflexis persistentibus, calycibus nudis, caule erecto*, grows naturally among the grass in the upland pastures of this country; but the seeds are frequently sold in the shops, and are by many mixed with the other sorts of clover and grass-seeds, for laying down ground to pasture. This plant grows with upright branching stalks about a foot high, garnished with trifoliate leaves, whose lobes are oblong and heart-shaped, but reversed, the narrow point joining the foot-stalks. The flowers, which are yellow, grow from the wings of the stalk, upon long foot-stalks, collected into oval imbricated heads, having naked impalements lying over each other like scales, somewhat like the flowers of hops, from whence the plant had the name of hop-clover. But there are two sorts of this clover, which

grow naturally in England: The other is a much smaller plant than this, and generally known by the name of none-such, or yellow hop-trefoil.

The hop-clover is strongly recommended by the following circumstances: 1. It not only grows, but flourishes on the most barren sands, and therefore must be a very proper grass to cultivate on such infertile soils, where any other grass that is worth notice will not grow at all. 2. It is not apt to swell cattle as the red clover does. 3. In good ground it will continue long, and bear a very good feed or crop, as Mr. Tull, though prejudiced against clovers, confesses; and, by its flourishing both on sands and clay, which have not been ploughed for many years, it seems likely to continue long in any soil.

CLOUGH, a valley between two steep hills: It also signifies a cliff.

CLOUGH, among traders, an allowance of two pounds to every three hundred weight, for the turn of the scale, that the commodity may hold out when sold by retail.

CLUE of a Sail, in naval affairs, implies the corner of a sail:

CLUE-GARNETS, the same to the main-sail and foresail, that the clue-lines are to all the other square sails.

CLUE-LINES, ropes fastened to lower clues or corners of the sails: their uses are to draw up each clue to the yard, for the more easy furling or reefing the sail.

CLUSIA, in botany, a genus of the polyandriamono-gynia class of plants, the flower of which consists of five large, roundish, patent, concave petals: the fruit is an ovated capsule, with six furrows, having six valves and six cells, containing numerous ovated seeds, covered with a pulp.

CLUTIA, in botany, a genus of plants, which produces male and female flowers on different plants; the male flower consists of five patent cordated petals; the female flower has persistent petals, as in the male.

The fruit is a globose, scabrous capsule, with six furrows and three cells, each containing a single roundish seed.

CLYPEOLA, in botany, a genus of plants, producing cruciform flowers, with six stamina, two of which are shorter than the others. The fruit is an orbiculated, plano-compressed, erect pod, indented at the top with two valves, containing round compressed seeds.

CLYSSUS, among the ancient chymists, implied an extract prepared from various ingredients mixed together, before the fluid was added; but the moderns use the word to signify a mixture, containing the various products of the same ingredient mixed together. Thus, for instance, when the distilled water, spirit, oil, and salt of wormwood, are so blended together, that the mixture is possessed of all the united virtues of the plant, from which the various preparations were obtained, it is called clyffus of wormwood.

CLYSTER, is a liquid remedy, to be injected chiefly at the anus into the larger intestines. It is usually administered by the bladder of a hog, sheep, or ox, perforated at each end, and having at one of the apertures an ivory pipe fastened with pack-thread. But the French, and sometimes the Dutch, use a pewter syringe, by which the liquor may be drawn in with more ease and expedition than in the bladder, and likewise more forcibly expelled into the large intestines. This remedy should never be administered either too hot or too cold, but tepid; for either of the former will be injurious to the bowels.

Clysters are prepared of different ingredients, according to the different intentions proposed.

Clysters are sometimes used to nourish and support a patient who can swallow little or no aliment, by reason of some impediment in the organs of deglutition: In which case they may be made of broth, milk, ale, and decoctions of barley and oats with wine. The English introduced a new kind of clyster, made of the smoke of tobacco, which has been used by several other nations, and appears to be of considerable efficacy when other clysters prove ineffectual, and particularly



in the iliac passion, in the *hernia incarcerata*, and for the recovery of drowned persons.

COACH, a commodious vehicle for travelling, too well known to need description.

COACH, in maritime affairs, a large apartment near the stern of ships of war; the floor of which is always level with the upper deck.

COADJUTOR, is properly used for a prelate joined to another, to assist him in the discharge of his function.

COAGULATION, a change in the state of any liquor, by which it alters its consistence, and from a fluid becomes a solid substance.

COAL, a black bituminous substance dug out of the earth, used for fuel in many countries.

COASTING, in maritime affairs, is that part of navigation where the places assigned are at no great distance, so that a ship may sail from one port to another, along the coast, without ever being out of sight of land.

COAT of Arms, in heraldry, a habit worn by the ancient knights over their arms, both in war and tournaments. These coats were frequently open, and diversified with bands and fillets of several colours, alternately placed. Hence they were called devices, as being divided and composed of several pieces sewed together.

COAT, among seamen, signifies a piece of tarred canvas nailed round that part of the mast or bowsprit, where they appear above the deck.

COATING, among chymists, implies the covering a retort, or other vessel, with a composition called lute, to prevent the violent action of the fire from melting the glass.

COBALT, in natural history, a singular species of arsenical ore. See the article ARSENICK.

COCCULUS INDICUS, Indian berry, a small fruit of a roundish figure, brought from Malabar and other parts of the E. Indies.

It is of a poisonous nature, and therefore never used except in ointments, and other topical preparations for destroying insects of the skin. Fishermen also use it, by mixing it with a paste of rye-meal, old cheese, spirit of wine, and other substances, for stupifying the fish: for pellets of this composition being thrown into the water, will be eaten by the fish; they become stupid, and float on the surface of the water, where they are easily taken.

COCCYX, in anatomy, the name of a pyramidal bone, situated at the extremity of the os sacrum.

COCHINEAL, *Coccinella*, in natural history, a small insect, brought chiefly from Mexico, and produced on a plant called opuntia, or prickly pear.

The Mexicans plant the opuntia round their habitations for the sake of the cochineal, of which they make several collections in the year. When the rainy season approaches, they know that their labour in collecting cochineal is over for that year: they therefore cut off the pieces of the opuntia on which there are any considerable number of cochineal insects, not yet arrived at their full growth: this they carefully place in their habitations. The pieces of the opuntia thus cut off, remain succulent during the whole rainy season; by which time the insects are found so well grown, that they are ready to bring forth their young.

The people now prepare for multiplying these for the next year's crop: they make little kinds of nests of moss, or other similar substances. Into each of these nests they put twelve or fourteen insects, and then carry them out, and place them between the leaves of the opuntia, the plantations of which they take care to have by that time in very good order. The prickles of the opuntia render it very easy to fix these nests, and in this manner they people their whole plantation in a few days; for these very cochineals in the nests make their first crop, which is gathered soon after. They allow between thirty and forty insects from the joining of every leaf of the plant to the next.

The free air has such an effect on these insects, that within three or four days after being exposed to it, they bring forth their young. Every mother brings forth several thousands, not larger than the minutest mite. The young insects soon leave the nests, and run about

the plant. They soon fix themselves, but always on the most succulent parts, and those least exposed to the wind, where they remain fixed till they have acquired their full growth, and are ready to bring forth their young. During all this time, they never injure the leaves, sucking only some part of the juice by their proboscis. In the colder countries, they for some time cover with matting the plants where the nests are placed, and on which the young insects are fixing themselves.

Multitudes of insects feed on the cochineal in its fixed state; but the people who raise them are at infinite pains to keep the plants clear of all others besides themselves. The ants are very fond of being about them, but it is only for the sake of the extravasated juice of the plants found near the wounds they make in them. The first crop of cochineal is that of the parent animals in the nests, which is a gathering very easily made. When they have brought forth their young, they die there, and there is no more trouble than taking the nests off the plant and shaking them out.

The second gathering is of the insects brought forth by these; this is about three months, more or less, after the former. The Indians brush these off the plants with a pretty stiff hair pencil, and catch them as they fall. In this second gathering they are very careful not to strip the plants wholly of the insects, leaving a great many of the old ones, and they never disturb the young already produced by the others. The third crop is furnished by these young ones, and those produced by the parent animals left there. This happens at about three months after; at which time these young ones are full grown, and are gathered as the former, only leaving a stock behind. Not long after this usually comes on the rainy season. The young insect, brought forth by those they leave on the plants at the third gathering, are what they find on the leaves which they at this time cut off and preserve, to furnish three or four successive crops the ensuing year.

They make the last gathering, when they cut off the leaves for housing. They are not at the pains to dislodge them singly with a pencil, but brush over the whole plants carelessly, so that there fall many fragments of the spines, &c. with the cochineal; and this is mixed with the old and young of various sizes: this is of much less value than the other more carefully picked cochineal, and the Spaniards call it granilla. The parent animals of the former gatherings would live many days after they were dislodged, and bring forth their young, which would get away in great quantity, and a great deal of the weight of the cochineal be lost: to prevent this the Indians destroy the creatures.

Some do it by plunging the basket, in which they are, into boiling water, and afterwards exposing it to the sun to dry them. Others have a coarse sort of ovens built on purpose, called temescales, into which they put the cochineal as soon as gathered, and give just heat enough to kill them. The Indian women have a kind of flat stone, under which they kindle a fire, and place their cakes of maize bread on; these they call comales, and some use them to kill the insects.

The difference in colour of the cochineal we receive is chiefly owing to the different methods of killing the insects, and the different degree of heat the Indians venture to give them. The cochineal, while living, is usually covered with a downy matter like our gall-insects. Those killed in hot water lose a great part of that powder. Those killed in the temescales retain this powdery matter, and become of greyish colour mixed with crimson; and finally that which is dried on the baking-stones runs a great hazard of being burnt, and generally becomes blackish. The Spaniards, who are very nice in their distinctions of the cochineal, call that killed in water, and which has lost its greyness, renegrida; that killed in the temescales, from its marble appearance, jas peada; and the last, which is generally overbaked and blackish, negra.

Four pounds weight of the dead parent animals of the first crop dry to one pound, and three pounds fresh of the other crops generally afford one pound dry.

The fecundation of the cochineal insect is the same with



with that of the kermes and all other of the gall-insect and progall-insect class. All the creatures fixed on the opuntia and gathered for cochineal are females. The males are quite different animals, being little flies no way resembling the cochineals, though produced by the same mothers. These, it is firmly believed, impregnate the cochineals.

By carefully soaking a large cochineal in warm water we not only see all the parts of an animal, but by gently pressing it one may force out of its body a number of red granules, which, when closely examined, prove to be embryos. This may be seen in the picked specimens of the finer mesteque cochineal, but vastly better in some of the larger specimens picked from among the wild cochineal, as it is called. This is a mixture of small and large grains.

The quantity of cochineal brought annually into Europe is said to be no less than eight or nine hundred thousand weight: of which the Spanish flota, Mr. Neufville observes, brings between two and three thousand ferons, each feron containing from one hundred and thirty to two hundred pounds weight; the vessels which precede the flota are charged with from seven to fourteen hundred ferons each; the English Assiento company import a large quantity; besides, other ships from the same part of the world are occasionally loaded with large quantities of it. At a moderate computation four thousand and eighty of these insects go to the ounce, and consequently sixty five thousand two hundred and eighty to the pound: what an immense number then is it that is collected of these little creatures every year.

It is a very singular circumstance attending cochineal, that it is not liable to decay. Cochineal preserved in a box, with no particular care at all, will keep ever so long unhurt; and after ever so great a time, is as fit for all purposes either of dying or medicine, as at first.

Mr. Neufville procured some cochineal which had remained in a store-house a hundred and thirty years, and was then perfectly good.

Cochineal was wholly unknown to the ancients. It possesses much the same virtues with kermes; it is esteemed a great cordial, sudorifick, alexipharmick, and febrifuge; but to make it singly a remedy for all kinds of fevers, the malignant ones not excepted, is carrying its praise a great deal too far. Hernandez tells us that the Indians use it as an astringent, mixing it in powder with strong vinegar. It is greatly used by the painters and dyers, the high crimson colour it affords being scarce equalled by any thing, and making, according to their different management of it, all the degrees and kinds of red.

Cochineal infused, or boiled in water, imparts a crimson tincture, inclining to purple. After the more soluble parts have been got out by light infusion or coction, the tinctures extracted from the remainder by successive fresh parcels of water, have more and more of a purple hue. Woollen cloth, prepared by boiling with a little alum and tartar, acquires a crimson dye on being boiled with a proper quantity of cochineal in fine powder.

The beauty of crimson, as Mr. Hellot observes, is to incline as much as possible to the gridelin, or to be extremely deep. Fixed alkaline salts give the desirable deepness, but tarnish the colour and diminish its lustre. Volatile alkalies have the same good effect as the fixed, without their bad one; but the great volatility of these salts occasions them to be so plentifully dissipated from the hot liquor, that a very large quantity would be necessary to effectually answer the purpose. Mr. Hellot, however, has discovered a method of applying them to good advantage: the cloth, dyed crimson in the usual manner, is dipt in a solution of a little sal ammoniack; and as soon as the liquor grows moderately warm, a quantity of pot-ash, equal to that of the sal ammoniack, is thrown in: the volatile alkali of the sal ammoniack is instantly extricated, and communicates to the cloth the brilliancy and deepness required.

A small quantity of the vitriolick acid, dropped into a decoction of cochineal, changes it to a purple: on adding more and more of the acid, the liquor becomes

flesh-coloured, and at last colourless. Spirit of nitre, in like manner gradually dropped in, first inclines the colour to yellow, then turns it quite yellow, and at last almost destroys it; the acid dissolving or attenuating the colouring particles, so as to render them indistinguishable by the eye.

Solution of tin in aqua regia heightens the colour into a scarlet, more or less fiery; that is, blended with more or less of a yellow hue, in proportion to the quantity of the solution: the liquor, thus heightened, communicates its own scarlet colour to woollen cloth prepared by boiling with tartar.

The wild cochineal, or sylvester, is greatly inferior to the fine sort, called simply cochineal: four parts of the former have no greater effect in dying than one of the latter. Nor does the sylvester answer in general so well as the other in regard to the beauty of the colour, particularly for scarlet.

COCHLEA, the screw, in mechanicks. See the article SCREW.

COCHLEARIA, *Scurvy-grass*, in botany, a genus of the tetradynamia-filiculosa class of plants, the flower of which consists of four vertically ovated petals, of the form of a cross; the fruit is a subcordated, lightly compressed, scabrous, bilocular pod, containing about four seeds in each cell.

It is heating, drying, and aperitive, of great use against the scurvy, dropy, and jaundice; and is often put into diet-drinks for those purposes; it must be remembered, however, that scurvy-grass and such warm plants, are only proper in an acid scurvy, being very pernicious in a putrid alkaline scurvy.

COCK, the English name of all gallinaceous birds.

COCK'S-COMB, in botany, a species of the amaranth. See the article AMARANTHUS.

COCK-PIT, in a man of war, a place on the lower floor, or deck, abaft the main-capstan, lying between the platform and the steward's room, where are partitions for the purser, surgeon, and his mates.

COCK-SWAIN, or COXSON, an officer on board a man of war, who has the care of the barge and all things belonging to it, and must be also ready with his crew to man the boat on all occasions: he sits at the stern of the boat, and steers.

COCKET, a scroll of parchment, sealed and delivered by the officers of the customs to merchants, as a warrant that their goods have paid the accustomed duties.

COCOA, or CACAO, in botany. See CACAO.

COCOON, the pod, or nest of the silk-worm.

COCOS, or Coco, the name of a nut produced in Malabar, and much used by turners, carvers, &c. for divers works.

COCTION, boiling, or the heating any fluid over the fire till a great number of bubbles rise in it.

This process is a species of a strong and powerful digestion; for which reason the ancient chymists, as Juncter informs us, frequently used the word instead of digestion.

COCTION of the *Aliments*, signifies their digestion, or reduction to a sort of chyle, in the stomach.

COCTION of the *Humours*, among the writers of institutes, imports the reduction of chyle to blood, which is called the second coction; and also the separation of any fluid from the blood by means of glands destined to this use, which is called the third coction.

COCTION of the *Morbifick Matter*, or the matter which forms the disease, is its reduction, either spontaneously, by the vital powers, or the force of medicines, to a natural and healthy state, so that it may be no longer offensive; or the preparing it for expulsion out of the body, by a salutary crisis.

CODE, *Codex*, a collection of the laws and constitutions of the Roman emperors, made by order of Justinian.

The Code is accounted the second volume of the civil law, and contains twelve books, the matter of which is nearly the same with that of the Digests, especially the first eight books; but the style is neither so pure, nor the method so accurate as that of the Digests; and it determines matters of daily use, whereas the Digests dis-



cuffs the more abstruse and subtle questions of the law, giving the various opinions of the ancient lawyers. Although Justinian's code is distinguished by the appellation of Code, by way of eminence, yet there were codes before his time; such were the Gregorian code and Hermogenean code, collections of the Roman laws made by two famous lawyers, Gregorius and Hermogenes, which included the constitutions of the emperors from Adrian to Dioclesian and Maximinus. 2. The Theodosian code, comprised in sixteen books, formed out of the constitutions of the emperors from Constantine the Great to Theodosius the Younger: this was observed almost over all the West, till it was abrogated by the Justinian code. There are also several later codes, particularly the ancient Gothick, and those of the French kings, as the code of Euridick, code-Lewis, code-Henry, code-Marchande, code des Eaux, &c. and the present king of Prussia has lately published a code which comprizes the laws of his kingdom in a very small volume.

**CODEx**, in antiquity, denotes a book or tablet, on which the ancients wrote.

**CODEx** was also a log fastened to the foot of a delinquent slave.

**CODIA**, among botanists, signifies the head of any plant, but more particularly, a poppy-head, whence its syrup is called diacodium.

**COECUM**, in anatomy, the first of the three large intestines called from their size *intestina crassa*.

**COEFFICIENTS**, in algebra, are such numbers, or known quantities, as are put before letters or quantities, whether known or unknown, and into which they are supposed to be multiplied. Thus, in  $3x, ax$ , or  $bx$ ; 3,  $a$  and  $b$ , are the coefficients of  $x$ ; and in  $6a, 9b$ ; 6, and 9, are the coefficients of  $a$  and  $b$ .

In a quadratick equation, the coefficient is, according to its sign, either the sum or the difference of its two roots.

In any equation, the coefficient of the second term is always equal to the sum of all the roots, keeping their proper signs.

The coefficient of the third term is the sum of all the rectangles, arising by the multiplication of every two of the roots, how many ways soever these combinations of two can be had, as three times in a cube, six in a biquadratick equation &c. See **EQUATION**.

The coefficient of the fourth term is the aggregate of all the solids made by the continual multiplication of every three of the roots, how often soever such a ternary may be had, and so on *ad infinitum*.

**CO-EFFICIENT** of any *Generating Term in Fluxions*, is the quantity arising from the division of that term by the generated quantity.

**COELESTIAL Observations**. See **OBSERVATION**.

**COELESTIAL Globe**. See the article **GLOBE**.

**COELIACK ARTERY**, in anatomy, the artery which issues from the aorta, just below the diaphragm. See the article **ARTERY**.

**COELIACK PASSION**, among physicians, a dreadful flux or diarrhoea, wherein the aliments, very little altered, pass off by stool.

**COENOBITE**, a religious who lives in a convent or community, under certain rules.

**COEUR**, in heraldry, a short line of partition in pale, in the centre of the escutcheon.

**COFFEA**, the **COFFEE-TREE**, in botany, a genus of the pentandria-monogynia class of plants, the flower of which consists of a single petal, of an infundibuliform shape; the tube is cylindrick and slender, many times longer than the cup; the limb is plane, longer than the tube, and divided into five segments of a lanceolated figure, with their edges bent backwards; the fruit is a round berry, with an umbilicated point; the seeds are two, of an elliptico-hemispherick figure, gibbose on one side, plane on the other, and wrapped up in a membrane.

We have properly two species of coffee-berries, or the fruit of the coffee-tree, the one thicker, heavier, and of a paler colour, brought from Mocha; the other is thinner, and generally of a greenish cast, and is brought us from Grand Cairo in Egypt.

Both kinds have the same qualities: neither of them

has much smell, till roasted, and both are of a farinaceous, leguminous taste while raw. Coffee is to be chosen firm, solid, and large, not easily broken, sufficiently dry, and of no bad smell: what is damp or musty may be sometimes reduced to a tolerable taste in roasting, if not too far gone, but it is never equal to the more perfect kind.

Coffee was wholly unknown to the Greeks, and even to the Arabian writers: the earliest knowledge of it is about three hundred and fifty years standing, and it has not been used above a third part of that time in Europe. Coffee is rather used as a food than as a medicine, yet it is so much in every one's way, that is, the liquor made of it, that it is proper for people to know, that it is very drying, and therefore in disorders of the head, from fumes and too great moistures, very serviceable by its absorbent qualities: this they must experience, who try it after a debauch of wine, or strong liquors. But in thin and dry constitutions it is very hurtful, as it dries the nerves too much, and is apt to make them tremble, as in palsies: by the same means it promotes watching, by bracing the fibres too tense for that relaxation which is necessary for sleep; though in a case of extraordinary defluxion of rheum from the glands about the head and stomach, in a cold constitution, occasioning a great hindrance from sleep, coffee, by absorbing the superfluous and continually distilling rheum, procures sleep. The coffee is also a stomachick and aperient: it is found to assist digestion, and to be good against flatulences; and custom of drinking it is of great service against habitual suppressions of the menses: it attenuates and dissolves the inspissated humours, and always proves diuretick, and sometimes gently cathartick.

**COFFER**, among mechanicks, signifies a long square box of the firmest timber, about three feet long, and one and a half broad, wherein tin-ore is broken to pieces in a stamping-mill.

**COFFER**, in architecture, a small depression or sinking of each interval between the modillions of the Corinthian cornice; generally filled up with a rose, sometimes with a pomegranate, &c.

**COFFER**, in fortification, a hollow lodgment athwart a dry moat, from six to seven feet deep, and from sixteen to eighteen broad.

The besieged generally make use of these coffers to repulse the besiegers, when they attempt to pass the ditch: they are distinguished only by their length from the caponiers, which are likewise somewhat less in breadth; and it differs from the traverse and gallery, in that these are made by the besiegers, and the coffer by the besieged.

To save themselves from the fire of these coffers, the besiegers epaule, or throw up the earth, on that side towards the coffer.

**COGNIZANCE**, in law, implies the authority or power of a court, to try the cause in question judicially.

**CO-HEIR**, one who succeeds to a share of some inheritance, which is to be divided among several.

**COHESION**, in philosophy, that action by which the particles of any body adhere together as if they were but one. See the article **ATTRACTION**.

**COHOBATION**, in chymistry, the returning a liquor distilled from any substance, back upon the same substance, and distilling it again, either with or without an addition of fresh ingredients.

**COHORT**, *Cohors*, in Roman antiquity, the name of part of the Roman legion, comprehending about six hundred men.

**COIF**, the badge of a serjeant at law, who is called serjeant of the coif, from the lawn-coif they wear under their caps, when they are created serjeants.

**COIN**, a species of money, made of metal, as gold, silver, or copper. Hence coin differs from money, as the species does from the genus; money being any matter, whether metal, wood, leather, glass, horn, fruits, shells, &c.

It seems derived from the French, *coign*; that is, *angulus*, a corner; whence it has been held, that the most ancient sort of coin was square with corners.

It is one of the royal prerogatives belonging to every sovereign prince, that he alone, in his own dominions, may



may order the quantities, value, and fashion of his coin: but the coin of one king is not current in the kingdom of another, unless at a great loss; though our king, by his prerogative, may make any foreign coin lawful money of England at his pleasure, by proclamation. By statute any person may break or deface any piece of coin suspected to be counterfeited or diminished, otherwise than by wearing: but if such pieces, on breaking, &c. are found to be good coin, it will be at the breaker's peril, who shall stand to the loss of it. Coins of gold or silver are to pass, notwithstanding some of them are cracked or worn; but not if they are clipped. Counterfeiting, clipping, or impairing the king's coin, is high treason; as also the making any stamps; dye, mould, &c. for coining, except by persons employed in the mint, &c. and the conveying such out of the mint is the same, and so is colouring metal, resembling gold or silver coin, marking it on the edges, &c. The statutes which ordained milled money to be made, give liberty to any person to refuse hammered silver coin, as not being the lawful coin of this kingdom.

The Jewish Coins, and values in English money are as follow:

	l.	s.	d.
Gerah	0	0	1 $\frac{50}{100}$
Bekah	0	1	1 $\frac{11}{100}$
Shekel	0	2	3 $\frac{3}{8}$
Maneh, Mina Hebraica	5	14	0 $\frac{3}{4}$
Talent	342	3	9
Solidus aureus, or sextula, worth	0	12	0 $\frac{1}{2}$
Siclus aureus, worth	1	16	6
A talent of gold, worth	5475	0	0

Value and proportion of the English COINS.

Farthing	2	Halfpenny
4	2	Penny
48	24	12 Shilling
120	60	30 $2\frac{1}{2}$ Half crown
240	120	60 $5\frac{1}{2}$ Crown
960	480	240 $20\frac{1}{4}$ Pound, account
1008	504	252 $21\frac{1}{2}$ $8\frac{2}{3}$ $4\frac{1}{3}$ $1\frac{1}{10}$ Guinea
		25 $10\frac{1}{4}$ $5\frac{1}{4}$ $1\frac{1}{4}$ Jacobus
		23 $9\frac{1}{4}$ $4\frac{3}{4}$ Carolus; or laureate.

In Scotland, by the articles of the union, it is appointed that all the coins be reduced to the English, and the same accounts be observed throughout the whole island. Till then, the Scots had their pounds, shillings and pence, as in England; but their pound was but twenty pence English, and the others were in proportion; accordingly, their mark was 13s. 4d. Scots, current in England at  $13\frac{1}{2}$ d. their noble in proportion.

Beside these, they had their turner, pence, and half-pence; their penny  $\frac{1}{2}$  of that of England: besides base money of achisons, babies and placks; the bodle  $\frac{1}{6}$  of a penny,  $\frac{1}{4}$  of the achison, 1 of the baby, and  $\frac{1}{2}$  of the plack.

In Ireland the coins are as in England, viz. guineas, shillings, &c. with this difference, that the English shilling passes for twenty-six half-pence, which are the only coin peculiar to that country.

**French COINS.** The only gold coin now current in France is the Louis d'or, with its divisions, which are half and quarter, and its multiples, which are the double and quadruple louis: till the year 1700, they had gold-llys and ecus or crowns; but they are now no more. The silver coins are the ecu and the grand ecu of six livres; pieces of twenty-four sols, of twelve sols, and of six sols. The billon coins are of two kinds, each called sols, some of fifteen deniers, others of twenty-one: to these may be added the deniers current in the Lionois, Provence, Dauphiny, and other parts. Lastly, the copper coin is the liard, equal to three deniers, and is ordinarily called the double.

VOL. I. No. 20.

Value and proportion of the French COINS.

Denier, equal to  $\frac{1}{6}$  of a farthing sterling.

	l.	s.	d.
Sol Paris is equal nearly to	0	0	0 $\frac{1}{2}$
Livre, accompt	0	0	10 $\frac{1}{2}$
Ecu	0	2	7 $\frac{1}{2}$
The old louis d'or is valued at	0	16	9.3
The new louis d'or at	1	0	0.6

**Spanish COINS.** In Spain, and the states depending upon it, the gold coin is the pistole; above which is the double pistole and piece of four pistoles, and under it the half pistole; to which must be added the castilians of gold. The silver money are the piastra, or piece of eight rials, and its diminutions; as also the simple rial, with its diminutions. The copper coins are the ochavos, or octavos, which are of two kinds, the one equal to four maravedis, and ordinarily called quarta; the other double this, and called double quarta; and lastly the maravedis. It must be observed, that in Spain they have new money and old; the old current in Sevil, Cadiz, Andalusia, &c. is worth 25 per cent. more than the new current at Madrid, Bilboa, St. Sebastian, &c. This difference is owing to their king, Charles II. who, to prevent the exportation of money, raised it 25 per cent. which, however, he was able to effect only in part, several provinces still retaining the ancient rate.

Value and proportion of the Spanish COINS.

Quarta, 4 maravedis	
Octavo, or double quarta	8 maravedis
Real old plata, equal to	0 0 6 $\frac{3}{4}$
Piece of eight, or piastra	0 4 6
Pistole	0 16 9.3

**Portuguese COINS.** Those of gold are the milleray of St. Stephen and the moeda d'oro, or, as we call it, moidore, which is properly their pistole; above this are doppio moedas or double pistoles, and quadruple species equal to five pistoles. The silver coins are the cruzada, pataca or piece of eight, and the vintem, of which they have two sorts, the one silver and the other billon. The ree is of copper, which serves them in accounts as the maravedis does the Spaniards.

Res, ree, or rez, equal to three-fifths of a farthing sterling

Vintem, 20 res.

Cruzada, 26 vintems.

Mi-moeda, or half pistole 0 13 6

Moeda d'oro, or pistole 1 7 0

Doppio moeda, or double pistole 2 14 0

Ducat of fine gold 6 15 0

Besides the above, they have also pieces of gold of the value of 3l. 12s. 1l. 16s. and other subdivisions.

**Dutch COINS.** Those of silver are crowns or dollars, ducatoons, florins, and shillings, each of which has its diminution. The stiver is of billon; the duy and penny, of copper.

	l.	s.	d.
Ducat of Holland	0	9	3.2
Ducatoon	0	5	5.59
Patagon, or rix dollar	0	4	4.28
The three-guilder piece, or sixty stivers	0	5	2.46
The guilder-florin, or twenty stivers	0	1	8.08
The lion dollar	0	3	7.07

The schelling goes for six stivers, and the ortke is the fourth part of a stiver.

**Flemish COINS.** Those of gold are imperials, rides or Philips, alberts, and crowns; those of silver are Philips, rix dollars, patagons, schellings, and guldens; and those of copper, patards.

	l.	s.	d.
Groat, 8 patards			
Single stiver	0	0	1 $\frac{1}{4}$
Schelling	0	0	7 $\frac{1}{2}$
Gulden	0	2	0
Rixdollar, dollar, patagon	0	4	6
Imperial	0	11	9

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The



The German, Dutch, and French coins are current here.

*German COINS.* Those of gold are ducats, which are of various kinds, oboli of the Rhine, and florins; of this last kind there are some likewise of silver, besides rix dollars and izelottes, which are all of that metal.

	s.	d.
Ducat of the Bishop of Bamberg	9	3 .2
Ducat of Hanover	9	2 .7
Ducat of Brandenburg	9	3 .2
Ducatoon of Cologne	5	5 .02
Rixdollar or patagon of Cologne	4	4 .53
Rixdollar or patagon of Liege	4	7 .48
Rixdollar of Mentz	4	7 .27
Rixdollar of Frankfort	4	6 .53
Rixdollar of the Palatinate and Nuremberg	4	7 .55
Rixdollar of Lunenburg	4	6 .65
Old rixdollar of Hanover	4	7 .03
Old bank dollar of Hamburgh	4	6 .92
Rixdollar of Lubeck	4	7 .54
Gulden of Hanover	2	4 .14
Gulden of Zell	2	3 .07
Gulden of Brandenburg	2	3 .81
Gulden of Saxony	2	4 .12

*Italian COINS.* The several states of Italy have several current monies, though there are some common to all, such as the pistole of gold, and the ducatoon and florin of silver, which are of various weights, fineness, &c. The coins peculiar to Rome are the julios of silver, the pignatelle of billon, and the bayoco, demibayoco, and quadrine of copper. Venice has its sequins of gold; its justins, or ducatoons, and derlingues of silver. Naples, its carlins, Genoa its crofaits, Savoy and Piedmont its lys: all silver: this last state has also papiroles and cavales of billon

#### Gold coins of Italy.

	s.	d.
The sequin of Venice	9	5 .7
The old Italian pistole	16	7 .6
Pistole of Rome, Milan, Venice, Florence, Savoy, Genoa	16	6 .7
Double ducat of Genoa, Venice, and Florence	18	7 .7
Single ducat of the same places	9	3 .8

#### Silver Coins.

	s.	d.
The old ducat of Venice	3	4 .50
The ducat of Naples	3	4 .43
The ducat of Florence or Leghorn	5	4 .62
The tarin, or fifth part of the ducat of Naples	0	8 .09
The carlin, or tenth part	0	4 .04
The escudi, or crown, of Rome, or piece of ten julios, or one hundred bayocos	5	1
The teston of Rome, or piece of three julios	1	6 .32
The julio of Rome	0	6 .10
The croifat of Genoa	6	6 .74
Justine of Venice	4	9
Derlingne, $\frac{1}{4}$ of the justine	1	2 $\frac{1}{4}$

*Swiss COINS* are ratzes and blazes of billon; the ratze equal to  $\frac{2}{3}$  of a penny sterling: and the blaze of Berne, nearly equal to the ratze.

The German, French, and Italian coins are current here.

#### Polish COINS.

	s.	d.
The gold ducat	9	2 .1
The old silver dollar of Dantzick	4	6 .27
The old rixdollar of Thorn	4	5 .85
The rixdollar of Sigismund III. and Uladislaus IV. kings of Poland	4	6 .4
Abra	1	0 $\frac{1}{5}$
Roup	0	4 $\frac{3}{4}$
Groch	0	0 $\frac{5}{6}$

#### Danish COINS are,

	s.	d.
The gold ducat	9	3 .2
The horse	1	1 $\frac{1}{2}$
The four-markpiece	2	8 .23
Marck lubs	1	6
Scheddal, or two marks	3	0
Rix mark	0	11
Slet mark	0	9

*Swedish COINS.* Those of copper are the roustique, alleuvre, mark, and money.

	s.	d.
A gold ducat is equal to	9	3 .2
An eight-mark piece of silver	5	2
A four-mark piece	2	7
A Christine	1	1 $\frac{1}{2}$
Caroline	1	5 $\frac{1}{4}$

The Swedish money, properly so called, is a kind of copper, cut in little square pieces, or plates, about the thickness of three English crowns, and weighing five pounds and a half, stamped at the four corners with the Swedish arms, and current in Sweden for a rixdollar, or piece of eight.

*COIN*, in architecture, a kind of dye cut diagonally, after the manner of a flight of a stair-case, serving at bottom to support columns in a level, and at top to correct the inclination of an entablature supporting a vault.

*COIN* is also used for a solid angle composed of two surfaces inclined towards each other, whether that angle be exterior, as the coin of a wall, a tree, &c. or interior, as the coin of a chamber or chimney. See *QUOIN*.

*COINING*, or *COINAGE*, the stamping and making money.

Formerly the fabrick of coins was different from what it is at present. They cut a large plate of metal into several little squares, the corners of which they cut off with shears. After having shaped these pieces, so as to render them perfectly conformable in point of weight to the standard-piece, they took each piece in hand again, to make it exactly round by a gentle hammering. This was called a planchet, and was fit for immediate coining. Then engravers prepared, as they still do, a couple of masses of steel, in form of dyes, cut and terminated by a flat surface, rounded off at the edges. They engraved or stamped on it the hollow of a head, a cross, a scutcheon, or any other figure, according to the custom of the times, with a short legend. As one of these dyes was to remain dormant, and the other moveable, the former ended in a square prism, that it might be introduced into the square hole of the block, which, being fixed very fast, kept the dye as steady as any vice could have done. The planchet of metal was horizontally laid upon this inferior mass, to receive the stamp of it on the side, and that of the upper dye, wherewith it was covered, on the other. This moveable dye, having its round engraved surface resting upon the planchet, had, at its opposite extremity, a flat, square and larger surface; upon which they gave several heavy blows with a hammer of an enormous size, till the double stamp was sufficiently in relieve on each side of the planchet. This, being finished, was immediately succeeded by another; and they thus became a standard-coin, which had the degree of fineness, the weight and mark, determined by the judgment of the inspectors to make it good current money. The strong tempering which was, and is still, given to the dyes, rendered them capable of bearing those repeated blows. Coining has been considerably improved and rendered expeditious by several ingenious machines, and by a wise application of the surest physical experiments to the methods of fining, dying, and stamping the different metals. The three finest instruments the mint-man uses are, the laminating engine, the machine to write on the edge of coins, and the mill.

After they have taken the laminæ or plates of metal out of the mould into which they are, cast they do not beat them on the anvil, as was formerly done; but they make them pass and repass between the several rollers of the laminating engine; which, being gradually brought closer and closer to each other, presently give the lamina its uniform and exact thickness. Instead of dividing this lamina into small squares, they at once cut clean out of it as many planchets as it can contain, by means of a sharp steel trapan, of a round figure, hollow within, and of a proportionable diameter to shape and cut off the piece at one and the same time. After these planchets have been compared and weighed with standard-pieces, and filed or scraped, to get off the superfluous part of the metal, and then boiled and made clean; they arrive at last at the machine (*plate XX. fig. 3.*) which marks them



Fig.1. Coining

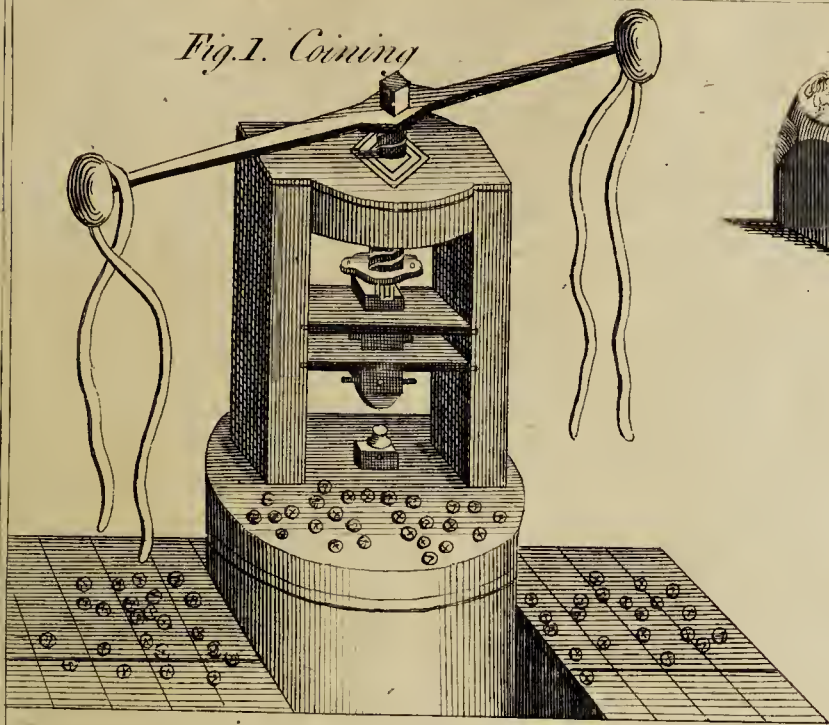


Fig.2. Coining

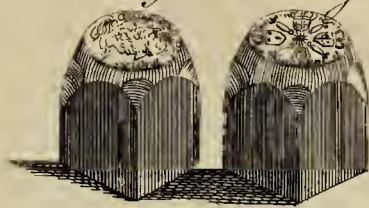


Fig.3.



Coining

Fig.5. Circumferenter

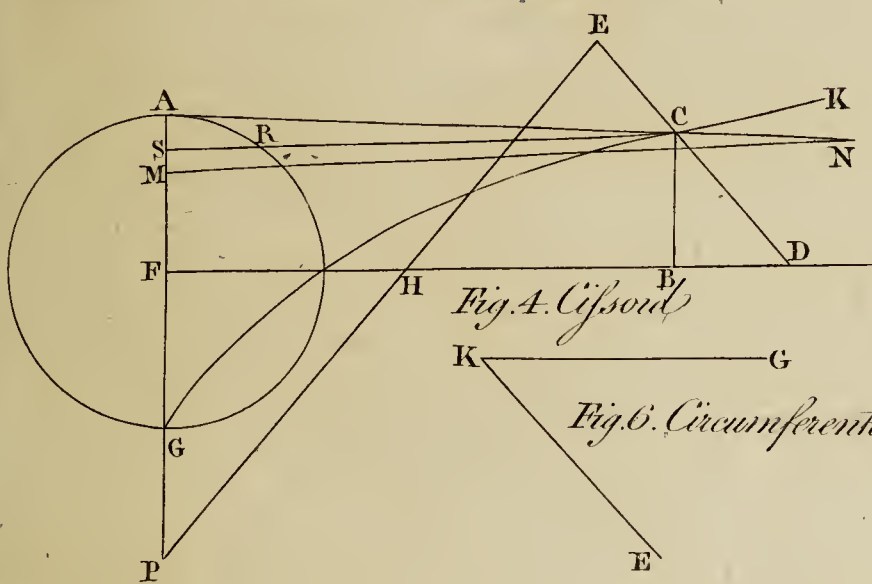
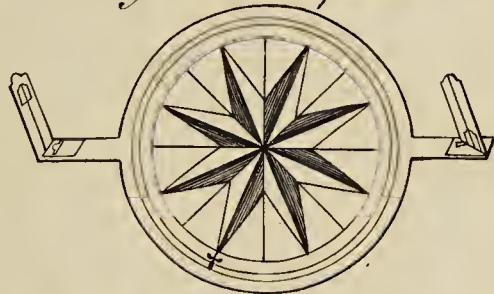


Fig.4. Cifsond

Fig.6. Circumferenter

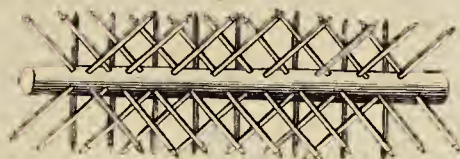


Fig.7. Chevaux de Frise



Fig.8. Colour

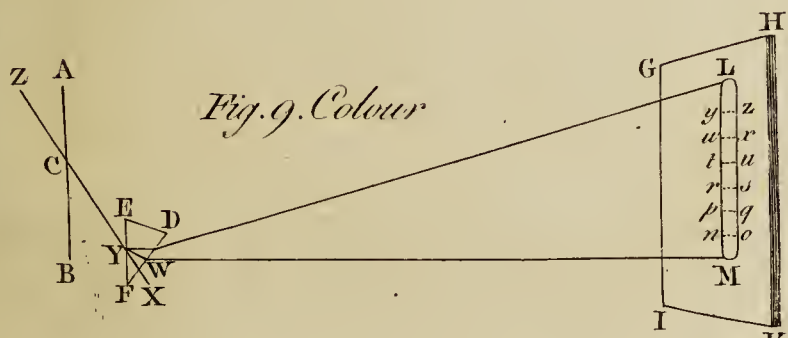


Fig.9. Colour

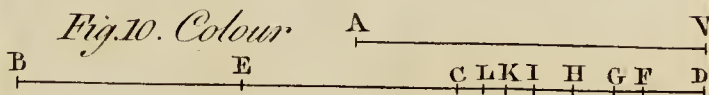


Fig.10. Colour

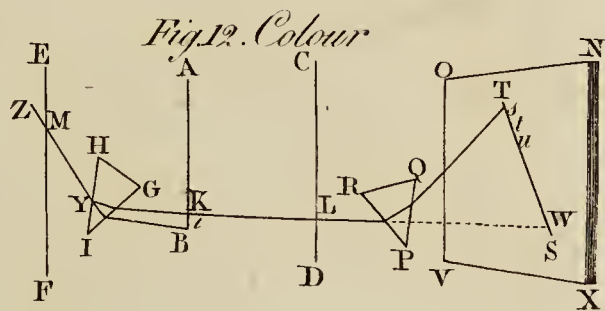


Fig.12. Colour

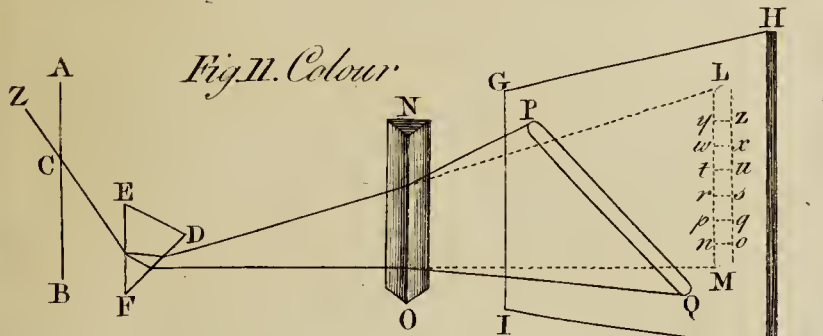


Fig.11. Colour

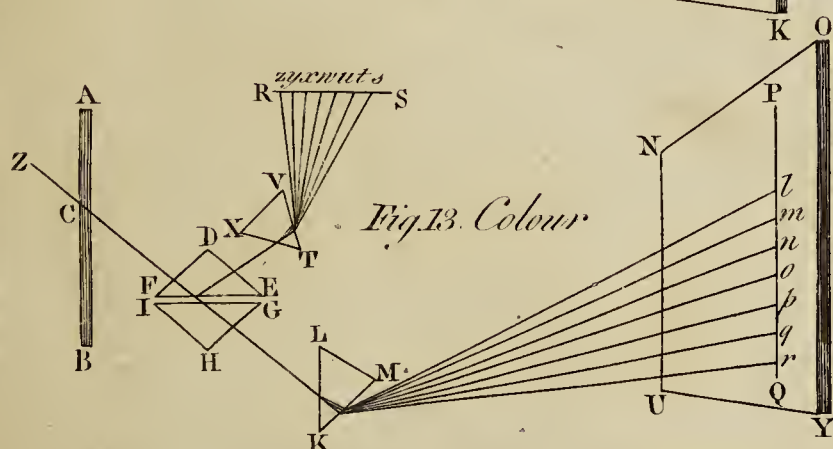


Fig.13. Colour

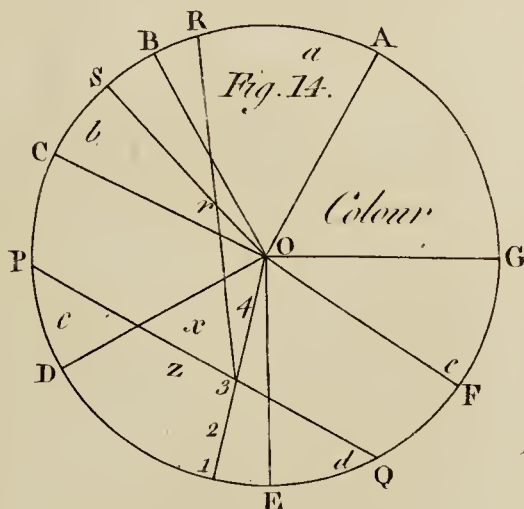


Fig.14.

Colour







them upon the edge, and finally the mill (*fig. 1.*) which squeezing each of them singly between the two dyes brought near each other, with one blow, forces the two surfaces or fields of the piece to fill exactly all the vacancies of the two figures engraved hollow. The engine, which serves to laminate lead, gives a sufficient notion of that which flattens gold and silver laminæ between rollers of a lesser size.

The principal pieces of the machine (*fig. 3.*) to stamp coins on the edge, are two steel laminæ, about a line thick. One half of the legend, or of the ring, is engraved on the thickness of one of the laminæ's, and the other half on the thickness of the other; and these two laminæ are straight, although the planchet marked with them be circular.

When they have a mind to stamp a planchet, they put it between the laminæ, in such a manner, as that these being each of them laid flat upon a copper-plate, which is fastened upon a very thick wooden table, and the planchet being likewise laid flat on the same plate, the edge of the planchet may touch the two laminæ on each side, and in their thick part. One of these laminæ is immovable, and fastened with several screws; the other slides by means of a dented wheel, which takes into the teeth that are on the surface of the laminæ. This sliding lamina makes the planchet turn in such a manner, that it remains stamped on the edge, when it has made one turn. Only crown or half-crown pieces can bear the impression of letters on the thickness of their edge.

The coining engine or mill is so handy, (*see plate XX. fig. 1.*) that a single man may stamp twenty thousand planchets in one day. Gold, silver, and copper planchets are all of them coined with a mill, to which the coining squares (*fig. 2.*) commonly called dyes, are fastened; that of the face under, in a square box garnished with male and female screws, to fix and keep it steady; and the other above, in a little box, garnished with the same screws, to fasten the coining square. The planchet is laid flat on the square of the effigy, which is dormant; and they immediately pull the bar of the mill by its cords, which causes the screw set within it to turn. This enters into the female screw, which is in the body of the mill, so that the bar causes the screw to turn with so much strength, that, by pushing the upper square upon that of the effigy, the planchet, violently pressed between both squares, receives the impressions of both at one pull, and in the twinkling of an eye. The planchet, thus stamped and coined, goes through a final examination of the mint-wardens, from whose hands it goes into the world.

CO-INDICATIONS, among physicians, denote signs, which, together with others, serve to indicate or point out the nature of the disease.

COITION, the intercourse between the male and female in the act of generation.

COIX, Job's tears, in botany, a genus of plants ranged by Linnæus among the monœcia triandria. The corolla consists of two valves, very slender, and of the length of the cup. The calyx is a glume containing two flowers. There is no pericarpium: the seed, which is solitary and roundish, is covered by the indurated calyx.

COLABRASIANs, in ecclesiastical history, a sect of hereticks that appeared in the third century, and maintained that the whole plenitude and perfection of truth and religion were to be found in the Greek alphabet; whence Christ is called Alpha and Omega.

COLARIN, in architecture, implies the small frieze placed in the capital of the Dorick and Tuscan orders, between the astragal and the annulets. It also signifies the orlo or ring on the upper part of the shaft of the column.

COLCOTHAR, in pharmacy, a preparation of vitriol, calcined to a redness.

COLD, a privation or absence of heat. See HEAT.

Artificial COLD, that produced by freezing mixtures. See the article FREEZING Mixtures.

COLD, in medicine, a stoppage or diminution of the natural perspiration.

What we commonly call catching cold, may be cured by lying much in bed; by drinking plentifully of warm

hack-whey, with a few drops of spirit of hart's-horn, posset-drink, water-gruel, or any other warm small liquor: In short, it ought to be treated at first as a small fever, with gentle diaphoreticks; and afterwards, if any cough or spitting should remain, by softening the breast with a little sugarcandy and oil of sweet almonds, or a solution of gum ammoniac in barley-water; taking care to go abroad well clothed.

This is a much more easy, natural and effectual way than the common practice by balsams, linctuses, pectorals, &c. which serve only to spoil the stomach, oppress the spirits, and hurt the constitution.

COLEWORT, among gardeners, a species of cabbage. See the article CABBAGE.

COLE-SEED, the seed of the *napus sativa*, or long-rooted, narrow-leaved, navea, and comprehended by Linnæus among the brassicas, or cabbage kind. See BRASSICA.

This plant is cultivated to great advantage in many parts of England, on account of the nape-oil expressed from its seeds. It requires a rich and strong soil, especially in marsh or fenny lands, those newly recovered from the sea, or indeed any other land that is rank or fat, whether arable or pasture. The best seeds are brought from Holland, and should be sown about Midsummer, the very day that the land is ploughed: a gallon will serve an acre.

Besides the oil already mentioned, it is likewise cultivated for winter-food to cattle, and is a very good preparative of land for barley or wheat.

COLICK, in medicine, a severe and very excruciating pain in the lower venter, or belly.

Hollerius, *De Morb. intern. cap. 39.* gives the following description of the colick: "It is seated in one particular place, like a stake that is fixed, yet sometimes make excursions to the groins, to the left kidney, or to both kidneys; sometimes takes a revolving course upwards, shifting its place according to the flexures of the colon, which, after it has left the rectum, is turned towards the left groin, from whence it ascends to the left kidney, where it is narrowest; and this narrowness, with its flexure at the same place, is the cause why the pain is more intense in that part. Hence the colon, becoming more lax, and enlarged, is extended to the spleen, and proceeds under the liver, where it sometimes adheres to the gall-bladder, and, from thence descending to the right ileon, ends at last in the intestinum cæcum."

There are different causes of these severe pains of the intestines; and, according to the nature, disposition and force of these causes, are the symptoms diversified, and the danger more or less to be apprehended. A very frequent cause is a retention and induration of the feces in the large intestines, and sometimes in the small ones, proceeding in a great measure from a load of acido-viscid crudities, dry, juiceless and astringent food, immoderate sleep, and a way of life unused to exercise and motion. In this obstructed and costive state of the belly, whenever it happens, that, upon the use of sweet aliments, and such as are subject to ferment, of fat flesh-meats, especially mutton, with drinking of cool liquors, and refrigeration of the feet and belly, the inflation of the abdomen is increased, and the pain exasperated, we may hence discern the nature and marks of the flatulent colick, which the ancients ascribed to a cold cause; and whose generation and frequent attacks suppose an imbecillity of the intestines, and a want of due tone and strength in those parts; whence this sort of colick is incident to fat and phlegmatick, as well as old and infirm persons, especially if they take not due care to keep the cold from their feet, back and belly.

Another kind of colick is the bilious, which, according to the ancients, owes its original to a hot cause, and arises from a bilious, acrid, corrupted humour, collected in too great plenty, and stagnating in the small intestines, especially the duodenum. It frequently succeeds a great fit of anger, especially in persons of a hot and dry constitution, in a hot season; or it proceeds from an excessive use of hot and spirituous liquors, and by cooling potions, which obstruct perspiration, is exasperated and rages with greater violence. The re-

mark-



markable symptoms which attend it, are, a hoarseness of the voice, the heart-burn, a continual loathing of food, a vomiting of porraceous bilious matter, the hiccup, a hot and feverish distemperature, restlessness, an intense thirst, a bitterness in the mouth, high-coloured urine, and little in quantity, which is sometimes succeeded by frequent and bilious stools.

From what has been said, it appears that the causes of this affection are surprisingly various; and it may be inferred, that the manner of treatment ought to be varied in a way suitable to the difference of the causes, whence the pain of the intestines proceeds.

When, from a suppression of the customary flux of the hæmorrhoids, or menses, especially in bodies abounding with blood, there arises a violent pain of the abdomen, attended with much heat, &c. a vein should be opened in the foot, then emollient clysters, antispasmodick powders, with a small portion of nitre, cinnamon, and castor should be used, and the feet bathed; and under a remission of the fit, care should be taken to restore the menses in women, and the hæmorrhoids in men, to their natural courses. When the pain of the intestines proceeds from a redundance of intemperate and caustick bile, the same remedies are of service.

But what exceeds these and all other remedies in this case, is a nitrous powder, mixed with a drop or two of the true distilled oil of millefolium, to be taken in three or four ounces of the water of common camomile flowers.

If the pain be tensive, and fixed in the right or left hypochondrium, or beneath the stomach, it is a sure sign that the disorder proceeds from flatulencies, or excrements inclosed within the flexures of the colon. In this case, the principal indication directs us to the use of clysters of an emollient, discutient, and corroborating quality, not omitting external applications of carminative and emollient liniments to the affected part.

When the rectum and part of the colon are affected with a strong convulsive stricture, so as to be incapable of transmitting either flatus or fæces, and a clyster cannot conveniently be introduced; the abdomen is to be fomented all over with hot and rich oils, by coction, particularly those of camomile, dill, or rue, boiled with the fat of a badger, dog, fox, beaver, &c. which may be introduced, if possible, into the belly by clysters.

A flatulent colick, proceeding from imbecillity, and want of a due tone of the stomach and intestines, admits of the use of carminative things somewhat hotter than ordinary. Among these are spirituous carminative waters prepared of the seeds of cumin and caraway, orange-peel, and the flowers of common Roman camomile, and cardamums, distilled in wine. *Hoffman.*

**COLLAR**, among seamen, implies a rope fastened round the beak-head of a ship, into which a deadman's eye is seized, and through which the lanyards pass that hold the main-stay.

**COLLAR of a Plough**, an iron ring fixed on the middle of the beam, wherein are inserted the tow and bridle chains.

**COLLAR of a Draught-horse**, a part of harness made of leather and canvas, and stuffed with straw or wool, to be put about the horse's neck.

**COLLARAGE**, a tax or fine laid for the collars of wine-drawing horses.

**COLLATERAL**, in geography, any thing, place, country, &c. situated by the side of another.

**COLLATERAL POINT**, in cosmography, the intermediate points of those between the cardinal points.

**COLLATION**, in the ecclesiastical law, implies the giving or bestowing a benefice on a clergyman by a bishop, who has it in his own gift or patronage.

**COLLEGE**, *Collegium*, an assemblage of several bodies or societies, or of several persons into one society.

**COLLEGE**, among the Romans, served indifferently for those employed in the offices of religion, of government, the liberal and even mechanical arts and trades; so that with them, the word signifies what we call a corporation or company.

**COLLEGE**, is also used for a publick place endowed with certain revenues, where the several parts of learning are taught. An assemblage of several of these col-

leges constitute an university. The erection of colleges is part of the royal prerogative, and not to be done without the king's licence.

The university of Oxford consists of nineteen colleges and six halls; that of Cambridge, of twelve colleges and four halls; and that of Paris, of fifty-four colleges, though in reality there is but ten where there is any teaching.

There were several colleges among the Jews, consisting generally of the tribe of Levi. The prophet Samuel seems to have made the use of them more publick, and brought them under several regulations: he is said to have founded the college of the prophets, &c.

As for the colleges of the christians, the apostles and seventy disciples may not improperly be said to be the first: afterwards St. Mark the Evangelist is said to have set up a publick school for reading, instruction, and interpretation of scripture at Alexandria. This school produced a great many persons eminent for their learning, as Clemens, Origen, Dionysius, Athanasius, &c.

Among the Greeks, the Lyceum and Academy were celebrated colleges; the latter of which has given its name to our universities, which in Latin are called *Academiæ*.

The Romans came late into the institution of such colleges: they had, however, several founded by their emperors, especially in Gaul; the chief of which were those of Marseilles, Lions, Besancon, and Bourdeaux.

Colleges of this kind have been generally in the hands of those devoted to religion. Thus the magi in Persia, the gymnosophists in the Indies, the druids in Gaul and Britain, had the care of educating youth in the sciences. After Christianity became established, there were almost as many colleges as monasteries; particularly in the reign of Charlemagne, who, in his capitulars, enjoined the monks to instruct youth in musick, grammar, and arithmetick: but this calling the monks from their solitude, and taking up too much of their time, the care of the college was at length put into the hands of such as had nothing else to do.

In the canon law, it is said, three persons make a college. The colleges in London are,

**COLLEGE of Civilians**, commonly called Doctors-Commons, founded by Dr. Harvey, dean of the arches, for the professors of the civil law residing in the city of London. The judges of the arches, admiralty, and prerogative court, with several other eminent civilians, commonly reside here.

To this college belong thirty-four proctors, who make themselves parties for their clients, manage their causes, give licences for marriages, &c.

In the common hall of Doctors-Commons are held several courts, under the jurisdiction of the civil law, particularly the high court of admiralty, the court of delegates, the arches court of Canterbury, and the prerogative court of Canterbury, whose terms for sitting are much like those at Westminster, every one of them holding several court days; most of them fixed and known by preceding holidays, and the rest appointed at the judge's pleasure.

**COLLEGE of Physicians**, a corporation of physicians in London, whose number, by charter, is not to exceed eighty. The chief of them are called fellows, and the next candidates, who fill up the places of fellows as they become vacant by death or otherwise. Next to these are the honorary fellows, and lastly the licentiates, that is, such as being found capable, upon examination, are allowed to practise physick.

**Sion-COLLEGE**, or the college of the London clergy, was formerly a religious house, next to a spittal, or hospital, and now it is a composition of both, viz. a college for the clergy of London, who were incorporated in 1631, at the request of Dr. White, under the name of the president and fellows of Sion-college; and an hospital for ten poor men, the first within the gates of the house, and the latter without.

This college consists of a president, two deans, and four assistants, annually chosen from among the rectors and vicars of London, subject to the visitation of the bishop.

**Gresham-COLLEGE**, a college founded by Sir Thomas



mas Gresham, who built the Royal Exchange; a moiety of the revenue whereof he gave in trust to the mayor and commonalty of London, and their successors for ever; and the other moiety to the company of mercers; the first to find four able persons to read on divinity, astronomy, musick and geometry; and the last, three or more able men to read rhetoric, civil law, and physick; a lecture upon each subject is to be read in term time, every day, except Sundays, in Latin, in the forenoon, and the same in English in the afternoon; only the musick lecture is to be read alone in English. The lecturers have each fifty pounds per annum.

**COLLEGE of Heralds**, commonly called the Heralds Office, a corporation founded by charter of king Richard III. who granted them several privileges, as to be free from subsidies, tolls, offices, &c. They had a second charter from king Edward VI. and a house built near Doctors-Commons, by the earl of Derby, in the reign of king Henry VII. was given them by the duke of Norfolk, in the reign of queen Mary, which house is now rebuilt.

**COLLEGIATE CHURCHES**, those which, though no bishop's see, yet have the retinue of the bishop, the canons and prebends.

**COLLET**, among jewellers, denotes the horizontal face or plane at the bottom of brilliants.

**COLLET**, in glass-making, is that part of glass vessels which sticks to the iron instrument wherewith the metal was taken out of the melting-pot: these are afterwards used for making green glass.

**COLLIERS**, in the marine, certain ships employed to carry coals from different parts of the north of England towards the metropolis and other places. This trade is very justly believed to be an excellent nursery for seamen; although they are often found, from the constitution of their climate, not to be so well calculated for southern navigation.

**COLLIFLOWER**, or **CAULIFLOWER**. See the article **CAULIFLOWER**.

**COLLIQUATION**, among physicians, a term applied to the blood, when it loses its crasis or balsamick texture; and to the solids, when they waste away from too profuse a perspiration.

**COLLIQUATIVE FEVER**, in physick, a fever attended with a diarrhoea, or profuse sweats, proceeding from too loose a contexture of the fluids.

**COLLISION**, the friction or percussion of two hard bodies one against another.

**COLLUSION**, in law, implies a secret understanding between two parties, who proceed fraudulently against each other, in order to injure a third person.

**COLLUTHIANS**, in ecclesiastical history, a religious sect that appeared in the fourth century, and maintained that God was not the author of the evils and afflictions of human life.

**COLLYRIDIANs**, in church history, a sect of ancient hereticks, who paid divine honours to the Virgin Mary.

**COLLYRIUM**, in medicine, a general name for any topical remedy, calculated to cure disorders in the eye.

**COLOCYNTHIS**, **COLOQUINTIDA**, or **BITTER-GOURD**, the dried medullary, or pulpy part of a species of gourd or cucumber, brought from Aleppo. It is very light, white, of a fungous texture, composed as it were of membranous leaves, with a number of roundish seeds lodged in the cavities.

The fungous medulla, freed from the seeds, which are somewhat unctuous and sweetish, like those of the common cucumber, has a nauseous acrid, intensely bitter taste. It is a very strong irritating cathartick; commended by some, not only as an efficacious purgative, but likewise as an alterative in obstinate chronic disorders; by others condemned, as a dangerous and deleterious drug. Thus much is certain, that when given by itself, in substance, in such doses as to purge effectually, as eight or twelve grains, it operates for the most part with great vehemence; disordering the constitution, occasioning violent gripes, and sometimes

bloody discharges. Its principal use is as a stimulus to other purgatives.

**Colocynth**, boiled in water, renders a large quantity of the liquor ropy and slimy; even a tincture of it made in proof spirit is so glutinous, as not to pass through a common strainer. The watery decoctions, inspissated, yield a large proportion, half the weight of the colocynth or more, of a mucilaginous extract, which purges strongly, but with much less irritation and greater safety than the colocynth itself, and appears to be the best preparation obtainable from this drastic drug.

**COLON**, in anatomy, the most considerable of all the intestines, except the cæcum.

**COLON**, in grammar, a stop or character serving to distinguish those conjunct members of a sentence, which are capable of being divided into other members, one of which at least is conjunct. It is marked thus (:), and indicates that the preceding sentence is perfect and entire, though some further illustration, &c. is subjoined.

**COLONEL**, in military affairs, the commander in chief of a regiment, whether horse, foot, or dragoons.

**COLONADE**, in architecture, a series of columns or pillars disposed in a circular form.

**COLONY**, a number of people transplanted to some distant region, in order to inhabit and cultivate the country.

**COLOPHONY**, in pharmacy, black resin boiled in water, and afterwards dried.

**COLOQUINTIDA**. See **COLOCYNTHIS**.

**COLOUR**, in philosophy, an inherent property in light, by which the different vibrations, proportional to the magnitudes of its component parts, are excited in the optick nerve, and by that means excite different sensations in the mind.

The illustrious Sir Isaac Newton has discovered, that there are different species of light; and that each species is disposed both to suffer a different degree of refrangibility in passing out of one medium into another, and to excite in us a different colour from the rest; and that bodies appear of that colour which arise from the composition of the colours the several species they reflect are disposed to excite.

In order to prove that this doctrine of the illustrious Newton is founded on truth; that there are actually different species of light; that each species is disposed to suffer a different degree of refrangibility, and to excite a degree of a different colour; let a room be darkened, and the sun permitted to shine through a small hole in the window-shutter, and be made to fall on a glass prism; or a triangular piece of glass, such as is represented in *plate XX. fig. 8.* then will the sun's light passing through this prism suffer different degrees of refraction, and by that means be parted into different rays; which rays being received upon a clean white paper, will exhibit the following colours, viz. red, orange, yellow, green, blue, indigo, and a violet purple.

Thus let *AB* (*plate XX. fig. 9.*) represent the window-shutter, *C* the hole in it, *DEF* the prism, *ZY* a ray of light coming from the sun, which passes through the hole, and falls upon the prism at *Y*; and if the prism were removed, would go on to *X*, but in entering its first surface *EF* shall be refracted into the course *YW*, falling upon the second in *W*, where, in going out into the air, it shall be refracted again.

Let the light now, after it has passed the prism, be received upon a sheet of white paper *GHIK*, held at a proper distance, and it will exhibit upon the paper a picture or image at *LM*, of an oblong figure, whose ends are semi-circular, and sides straight; and it shall be variegated with colours after the following manner:

From the extremity *M*, to some length, suppose to the line *no*, it shall be of an intense red; from *no* to *pq* it shall be of an orange colour; from *pq* to *rs* it shall be yellow; from thence to *tu* it shall be green; from thence to *vx* blue; from thence to *yz* indigo; and from thence to the end violet. And if the whole image be divided lengthwise into 360 equal parts, the red shall take up 45 of them, the orange 27, the yellow 48, the green 60, the blue 60, the indigo 40, and the violet 80.



Sir Isaac Newton, in his *opticks*, has shewn how, from the refraction of the most refrangible and least refrangible rays, to find the refraction of all the intermediate ones. His rule is this; if the sine of incidence be to the sine of refraction in the least refrangible rays, as AV to BC (*fig. 10.*) and to the sine of refraction in the most refrangible, as AV to BD; and if CE be taken equal to CD, and then ED be so divided in F, G, H, I, K, L, that ED, EF, EG, EH, EI, EK, EL, EC, may be proportional to the eight lengths of musical chords, which shall sound the notes in an octave, ED being the length of the key, EF the length of the tone above that key, EG the length of the lesser third, EH of the fourth, EI of the fifth, EK of the greater sixth, EL of the seventh, and EC of the octave above that key; that is, if the lines ED, EF, EG, EH, EI, EK, EL, and EC, bear the same proportion to each other, as the numbers 1,  $\frac{8}{9}$ ,  $\frac{5}{6}$ ,  $\frac{3}{4}$ ,  $\frac{2}{3}$ ,  $\frac{1}{2}$ ,  $\frac{2}{3}$ ,  $\frac{1}{2}$ , respectively, then shall BD, and BF be the limits of the sines of refraction of the violet rays; that is, the violet coloured rays shall not all of them precisely have the same sine of refraction; but none of them shall have a greater sine than BD, nor a less than BF, though there be violet-coloured rays which answer to any sine of refraction that can be taken between these two. In the same manner BF and BG are the limits of the sines of refraction of the indigo; BG and BH are the limits belonging to the blue; BH and BI the limits pertaining to the green; BI and BK the limits for the yellow; BK and BL the limits for the orange-coloured rays; and, lastly, BL and BC, those of the sines of refraction belonging to the red.

And particularly, when light passes out of glass into air, if the sine of its angle of incidence be 50, the sine of the angle of refraction of the red will be between  $77\frac{1}{8}$  and  $77\frac{1}{5}$ , of the orange-coloured between  $77\frac{1}{8}$  and  $77\frac{1}{5}$ , of the yellow between  $77\frac{1}{5}$  and  $77\frac{1}{3}$ , of the green between  $77\frac{1}{3}$  and  $77\frac{1}{2}$ , of the blue between  $77\frac{1}{2}$  and  $77\frac{2}{3}$ , of the indigo between  $77\frac{2}{3}$  and  $77\frac{7}{9}$ , and of the violet-coloured rays between  $77\frac{7}{9}$  and 78.

To render this proof complete, we must now shew that these dispositions of the rays of light to produce some one colour, and some another, which manifest themselves after being refracted, are not wrought by any action of the prism upon them, but are originally inherent in those rays; and that the prism only affords each species an occasion of shewing its distinct quality, by separating them one from the other, which before, while they were blended together in the unrefracted light of the sun, lay concealed.

This will be proved by the following experiment: things remaining as in the foregoing one, let another prism as NO (*plate XX. fig. 11.*) be placed either close to, or at some distance from the first, in a perpendicular situation, with respect to the former, so that it may refract the rays issuing from the first, sideways. Now, if this prism could separate the light which falls upon it into coloured rays, as the other did, it would divide the image breadthwise into colours, as before it was divided lengthwise; but no such thing is observable; for the image should only be thrown out of the perpendicular situation LM into the oblique one PQ; the upper parts, which were more refracted in the former case, being more refracted in this; and therefore made to reside further sidewise from their former situation L, than the lower ones are from M. And further, each colour shall be uniform from side to side in the oblique image as well as the perpendicular one.

If there be any objection against the sufficiency of this proof, it must be that the rays, when they fall upon the second prism, are not all in the like circumstances with regard to their inclination to its surface; we shall therefore, to obviate that objection, add one more experiment, which seems to be peculiarly adapted to that purpose. It is as follows:

Two boards, AB, CD, (*plate XX. fig. 12.*) being erected in a darkened room at a proper distance, one of them AB, being near the window-shutter EF, a space being left only for the prism GHI to be placed between them; so that part of the rays which enters the hole M, may, after passing through the prism, be transmi-

ted through a smaller hole K, made in the board AB, and passing on from thence to go out at another hole L, made in the board CD, of the same size as the hole K, and small enough to transmit the rays of one colour only at a time. Let another prism PQR be placed behind the board CD to receive the rays passing through the holes K and L, and after refraction by that prism, let the rays fall upon the white surface ST. Suppose first the violet light to pass through the holes and to be refracted by the prism PQR to *s*, which, if that prism were not there, would have passed on to W. If the prism GHI be turned about slowly, so that the incident ray ZY may fall more obliquely upon it, while the boards and the other prism remain fixed, in a little time another colour, suppose indigo, which we may suppose before to have proceeded to *s*, will pass through the holes K and L; and if the prism PQR were removed, would proceed like the former rays to the same point W. Now the refraction of this prism will not carry these rays to *s* as it did at the other, but to some place less distant from W, as to *t*. But it is manifest, that the holes K and L being in the same situation in each case, both sorts of rays enter the prism PQR under the same circumstances, for they are equally inclined to its surface RP, and enter it at the same point thereof; which shews that the one species is more diverted out of its course by refraction, than the other is, when the circumstances of incidence are the same in each. Further, if the prism GHI be turned about till the rays which exhibit blue pass through the hole L, these will fall upon the surface ST below *t*, as at *u*, and therefore are subject to a less degree of refraction than such as produce indigo. And thus by proceeding, it will be found that the green is less refracted than the blue, and so of the remaining colours, according to the order in which they are represented in an image formed by a single prism. And also each species of rays is disposed to excite in us the idea of a different colour.

This is sufficiently clear from what has been already said, and is further confirmed by what follows, viz. that whatever species of rays are thrown upon any body, they make that body appear of their own colour. Thus minium in red-light appears of its own colour; but in yellow-light it appears yellow; and in green-light, green; in blue, blue; and in violet-purple-coloured light it appears of a purple colour: in like manner verdigrise will but on the appearance of that colour in which it is placed. But each of these bodies appears most luminous and bright when enlightened with its own colour, and dimmest in such as are most remote from that.

It is certain, therefore, each ray is disposed to excite its own colour, which is neither to be altered by refraction nor reflection. Thus much in confirmation of the first part of the proposition, viz. that there are different species of light, and that each species is disposed to suffer a different degree of refrangibility, and to excite in us the idea of a different colour. We proceed now to the second part of the proposition, viz.

2. That bodies appear of that colour which results from a composition of those colours which the several species they reflect are disposed to excite.

We have just now seen that each ray, whatever be the colour of the body it is reflected from, is able to excite no other idea than that of its own colour; and that coloured bodies reflect not all the different sorts of rays that fall upon them in equal plenty, but some sorts, viz. those of their own colour, much more copiously than others. We will now proceed to shew, that the other colours may be produced from a mixture of those seven, which rays of light, when separated by a prism, are disposed to exhibit. From whence it will be rational to conclude, the bodies appear of that colour which arises from the mixture of those which they reflect.

1. All the prismatic colours, viz. those that are made by the prism, mixed together, appear white, a little inclining to yellow, such as is that of the sun's light.

To shew this, let a convex lens be placed between the prism and the paper which receives the image, in order that the rays separated by it may be collected into a focus: and let this focus fall upon the paper, then will



the spot where it falls appear white. And that the whiteness of this focal point is owing to the union of those colours appears from hence, that if we remove the paper from the focal point, and suffer the rays to cross each other in the focus; and if, when they have proceeded to some distance beyond, they be then received upon the paper, the same coloured image will be exhibited, and inverted, because the rays cross each other in the focus; an evident proof that the whiteness of the spot was owing to nothing but the mixture of the rays constituting the several colours of the image. But if the rays of any particular colour be intercepted before they are collected in the said spot, it then appears not only of a different colour from what it did before, but different from any of the prismatic colours taken separately. Or if the circumference of a wheel be painted with the prismatic colours taken in the same proportion with respect to each other, in which they are exhibited in the image made by the prism, and the wheel be turned swiftly about, the circumference of that wheel shall appear white: if they are taken in other proportions, the colour of the wheel, when turned about, will vary accordingly. From whence this part of the proposition is also abundantly clear.

No composition of these colours will produce black; that being no colour, but the defect an absence of all colour whatever. That species of light which is disposed to suffer a greater degree of refraction, requires proportionally less obliquity at the second surface of any medium to occasion a total reflection of it there; so that it is possible that a ray of light may pass through a medium with such obliquity, that only that part of it which is disposed to exhibit a violet colour shall be reflected at the second surface, and all the rest transmitted there. This indeed is a necessary consequence of what was observed concerning the reflection of light at the second surface of any medium, viz. that the reflection of a ray is total, when the obliquity of the incident ray is such, that the angle of refraction ought to be equal to, or exceed a right one. This is a consequence of that, because the angle of the refraction of the violet-coloured light is larger than the angle of refraction of any other, though their angles of incidence are equal. And accordingly thus it happens, as appears by the following experiment.

Let *AB* (*plate XX. fig. 13.*) represent the window-shutter of a darkened room; *C* a hole to let in a ray of the sun; *DEF*, *GHI*, two prisms so applied together that the sides *EF* and *GI* be contiguous, and the sides *DF* and *GH* parallel: in this situation light will pass through them without any separation into colours; for the opposite sides being parallel, if the rays are refracted one way where they go in, they will be as much refracted the contrary way where they go out. But if it be afterwards received by a third prism *KLM*, it will be divided so as to form upon any white body *NOYU* the usual colours, violet at *l*, indigo at *m*, blue at *n*, and red at *r*. Now let it be supposed that the surfaces *EF* and *GI* are not quite close together; but that the rays, in passing from one to the other, pass through a medium (viz. the air) of different density from that of the prisms; and that the ray *ZC* is not so much inclined to the second surface of the prism as to cause a total reflection of any one species there; then will part only of each species be reflected, and part transmitted.

Let now the reflected rays be received by a fourth prism *TXV*; these, after passing through it, will paint upon a white surface *RS*, the colours of the prism, viz. red at *s*, orange at *t*, yellow at *v*, and violet at *z*. Let now the prisms *DEF*, *GHI*, be slowly turned about, keeping still the same situation with respect to each other, until the obliquity of the rays *ZC* to the surface *EF* be so far increased, that there shall begin to be a total reflection of them there. In which case it is observable, that first of all the violet light will be totally reflected, and will therefore disappear at *l*, appearing instead thereof at *z*, and increasing the violet light which fell there before. And when the rays *ZC* become more oblique by the prisms being turned further about, the indigo shall be totally reflected, disappearing at *m*, but falling upon *y*, and making the violet there more intense: and by turning the prisms still further about, all the remaining co-

lours will be successively removed from the surface *PQ* to *RS*.

We are now to enquire what it is that give bodies this power of reflecting, some one sort of rays most copiously, and some another: and this is probably no other than the different magnitude of the particles whereof they are composed, as will appear from the following observations:

If water be prepared with soap so as to render it sufficiently tenacious, and then blown up into a bubble; it is observable, that as the bubble grows thinner and thinner, as it will do by reason of the water's continually running down from the top of it, till it breaks, different colours will arise one after another at the top of the bubble, spreading themselves into rings, and descending, till they vanish at the bottom in the same order they arose at the top.

Thus in an experiment of this kind, tried by Sir Isaac Newton, the colours arose in this order; first red, then blue, to which succeeded red a second time, and blue immediately followed; after that red a third time, succeeded by blue; to which followed a fourth red, but succeeded by green; after this a more numerous order of colours, first red, then yellow, next green, and after that blue, and at last purple; then again red, yellow, green, blue, violet, followed each other; and the last order of colours that arose was red, yellow, white, blue; to which succeeded a dark spot that afforded scarce any light, though it was observed to cause some very obscure reflection, for the image of the sun or candle might be faintly discerned in it; and this last spot spread itself more and more till the bubble broke.

Now it is apparent that the only reason why these different colours succeeded each other at the top of the bubble, in the above-mentioned manner, was because its thickness in that part continually varied, till it broke. It remained therefore to examine what was the thickness of the bubble at the top, at the time it exhibited each particular colour: and this was effected by the following contrivance, viz. by taking the object-glass of a long telescope, such having but a very small degree of convexity, and placing it upon a flat glass; these glasses, by reason of the convexity of the former, would touch but in one point, and the distance between them, where they did not touch, would be exceedingly small, but larger, the further we consider it from the point of contact. Now water being put between these glasses, the same colours appeared as in the bubble, in the form of circles or rings surrounding the point where the glasses touched, which point appeared black like the top of the bubble when it is thinnest. Next to this spot lay a blue circle, and next without that a white one, and so on in the same but contrary order to that in which the colours arose on the top of the bubble.

Now the distance between the glasses, that is, the thickness of the body of water between them, where it exhibited any one colour of a particular order, was equal to the thickness of the bubble at the time the same colour appeared upon it. For though the medium the light must pass through to come at the water is, in one case, glass, and in the other, air; that makes no difference in the species of the colour reflected from the water: for pieces of Muscovy glass, made thin enough to appear coloured, would have their colours faded, but not the species of them altered by being made wet with water: but it was found that transparent bodies of different density would not, under the same thickness, exhibit the same colours; for if the forementioned glasses were laid upon each other without any water between them, the air between them would then afford the same colours as the water, but more expanded; so that each ring had a larger diameter, though they bore all the same proportion to each other; so that the thickness of the air, proper to reflect each colour, was in the same proportion larger than the thickness of the water adapted to reflect the same.

Further, all the light which is not reflected by the thin substances, whether of air or water contained between the glasses, is transmitted through them; for when viewed from the other side, they exhibit also coloured rings as before, but in a contrary order; for the middle spot,



spot, which in the other view appears black for want of reflecting light, now looks perfectly white; next without this spot, the light appears tinged with a yellowish red; where the white appeared before, it now seems black, and so of the rest.

It is further observable, that the forementioned thin plates, whether of air or water, did not appear of the same colour when viewed obliquely, as when seen direct; for if the rings and colours between a convex and plain glass be viewed first in direct manner, and then under different degrees of obliquity, the rings will be observed to dilate themselves as increased. But a plate of air between the glass alters its colour much sooner than the water in the bubble, which is surrounded with air: for in the water, when viewed obliquely, the same colour might be seen at more than twelve times the thickness it appeared at under a direct view; but when the air was viewed under such an obliquity, that the thickness of the plate, where it was observed, was but half as much again as when it was viewed directly, a different colour appeared.

Lastly, the same colour reflected from a denser substance reduced to a thinner plate, and surrounded by a rarer, will be more brisk than the same colour, when reflected from a thin plate formed of the rarer substance, and surrounded by the denser; as was found by blowing glass very thin, which exhibited in the open air more vivid colours than the air does between two glasses.

As to the thickness of the plate of air by which the several colours were reflected, it was found by carefully measuring the distances of the rings from the points where the glass is touched, that the distance between the glasses where the first order of colours was reflected, was from  $\frac{1}{178000}$  to  $\frac{7}{178000}$  part of an inch; that where the second, was from  $\frac{3}{178000}$  to  $\frac{4}{178000}$ ; that where the third, from  $\frac{5}{178000}$  to  $\frac{6}{178000}$ , and so in a series of the odd numbers: and that the distance of the glasses, where the first order of colours that was transmitted passed through, was from 0 to  $\frac{1}{178000}$  part of an inch; that where the second, was from  $\frac{2}{178000}$  to  $\frac{3}{178000}$ ; that where the third, from  $\frac{4}{178000}$  to  $\frac{5}{178000}$ , and so on in a series of the even numbers. And the thickness of a plate of water, where it reflected or transmitted the same colours, was  $\frac{3}{4}$  of the thickness of the plate of air.

Now we learn from experiments made with the microscope, that the least parts of almost all bodies are transparent; or the same may be experienced in the following manner: take a very thin plate of the opaque body, and the room being darkened, apply it to a small hole in the window-shutter, and it will sufficiently discover its transparency. This experiment cannot be so well performed with a white body, because of the strong reflecting power in such; but even those, when dissolved in aquafortis or other proper menstrua, do also become transparent. Wherefore if we should suppose any body reduced to a thinness proper to produce any particular colour, and then broken into fragments, in all probability each fragment would exhibit that colour, and a heap of such fragments would constitute a body of that colour; so that the cause, why some bodies reflect one sort of rays most copiously, and some another, is probably no other than the different magnitude of their constituent particles.

This Sir Isaac Newton thinks a probable ground for making conjectures concerning the magnitude of the constituent particles of bodies. The green of vegetables he takes to be of the third order, as likewise the blue of the syrup of violets. The azure colour of the sky he thinks is of the first order, as also the most intense luminous white; but if it is less strong, he then conjectures it to be a mixture of the colours of all the orders. Of the latter sort he takes the colour of linen, paper, and such like substances to be; but white metals to be of the former sort. For producing black the particles must be smaller than for exhibiting any of the colours, viz. of a size answering to the thickness of the bubble where it reflected little or no light, and for that reason appeared colourless.

The colours in the same part of a peacock's tail vary as the tail changes its posture with respect to the eye; just so the thin plates of air or water appear of a

different colour in the same plate when viewed directly, from what they do when seen obliquely, as observed above. A thousand other instances might be added; but enough has been said to prove that the present proposition is founded on truth.

COLOUR, among painters, is sometimes used to imply the drugs or simple colours themselves, and sometimes the tints produced by a mixture of these drugs.

The principal colours used by painters are red and white lead, yellow and red oakers; several kinds of earth, umbre, orpiment, lampblack, burnt ivory, black lead, cinnabar, vermilion, gamboge, lac, blue and green ashes, verdigrise, bestre, bice, smalt, carmine, ultramarine, &c. See each under its proper article.

*Theory of the Composition of COLOURS.* In considering the nature of the rays of light in general, and the separation of the different colours from the rays by means of a prism, we demonstrated that whiteness is produced by a mixture of the different colours, and that all the shades of colours are produced by a mixture of different rays. And upon these principles the whole doctrine of mixing colours in such proportions as to produce any tint desired is founded.

In order to this, the colours are to be disposed in the following manner: describe the circle ADFA, (*plate XX. fig. 14.*) and divide the circumference into seven equal parts, AB, BC, CD, DE, EF, FG, GA, in the same proportion to one another as the fractions  $\frac{1}{7}, \frac{2}{7}, \frac{3}{7}, \frac{4}{7}, \frac{5}{7}, \frac{6}{7}, \frac{7}{7}$ , which are the proportions of the musical notes *Sol, la, fa, sol, la, mi, fa, sol*. Between A and B place all the kinds of red, from B to C place all the kinds of orange, from C to D place all the kinds of yellow, from D to E place all the kinds of green, from E to F place all the kinds of blue, from F to G place all the kinds of indigo, and from G to A place all the kinds of violet. Having thus disposed the simple colours, the centre of the circle O will be the place of white. And between the centre and the circumference are the places of all the broken compounded colours, those nearest the centre being the most compounded, and those furthest from it being the least compounded: as in the line OI, all the colours at 1, 2, 3, 4, are of the same species; that is, green inclining toward blue; but the colour at 1 is the simple natural colour; that at 2 is something compounded, or broken; that at 3 is more broken; and that at 4 is still more broken.

The colours being thus disposed, to know what colour results from the mixture of any colours given, find the centre of gravity of the places of the colours given, and that will shew the character of the compounded. For example, suppose it were required to know what colour would result from the mixture of two parts of the simple yellow at P, with three parts of the simple blue at Q; first find the centre of gravity 3 of the points P and Q thus: draw PQ, and having divided it into five parts, (which is the sum of three and two) take the point 3 three parts from P, (because there are three parts of blue) and two parts from Q (because there are two parts of the colour at P;) then draw O 3 cutting the circumference in 1, by the place of the point 1, (which is between D and E, but nearer to E) we find the mixture is a green, inclining towards blue; but because 3 is near the middle between the centre and the circumference, the colour is pretty much broken. To make the same thing more clear by another example; suppose you would know what would result from a mixture of two parts yellow at P, three parts blue at Q, and five parts red at R. First is found the place 3 of the mixture of the yellow and the blue, as before; then drawing the line 3R (because there are five parts of the colour at 3, and five parts of the colour at R) divide it into ten parts, and take the point r five parts distant from R. By this means r is the centre of gravity of the three colours at P, Q, and R, and is consequently the place of the mixture; which by drawing Or cutting the circumference in s, is found to be an orange a little inclining towards red; and because r is much nearer the centre than the circumference, the colour is very much broken: and thus one may proceed in other cases.

Again,



Again, having given the place of any compound colour, one may find what colours may be mixed to compound it. Thus, having given the colour at 3, drawing any line  $P_3Q$  through 3, the colour proposed may be made by a mixture of the colours in  $P$  and  $Q$ , taking such a proportion of them as is expressed by the lines  $3P$  and  $3Q$ ; that is, taking of the colour  $P$  as much as in proportion to  $3Q$ , and as much of the colour  $Q$  as is in proportion to  $3P$ ; or having drawn  $O_3$  passing through the points 1, 2, 4, the same colour may be produced by mixing the colours in 2 and 4, in proportion to the lines 4, 3, and 2, 3, or it may be produced by breaking the simple colour at 1, with white (which is at  $O$ ) in the proportion of the lines 3, 1, and 3  $O$ : and thus in other cases.

The proportions hitherto mentioned of the colours to be used in the mixtures, relate to the quantity of the rays of light, and not to the materials which artificial colours are made of. Wherefore if several artificial colours were to be mixed according to these rules, and some of them are darker than others, there must be a greater proportion used of the darker materials, to produce the hue proposed, because they reflect fewer rays of light in proportion to their quantities; and a lesser proportion must be used of the lighter materials, because they reflect a greater quantity of light.

But the difficulty consists in knowing the nature of the material colours used in painting, for was this so perfectly known that one could tell exactly what species of colour, how perfect, and what degree of light and shade each material has with respect to its quantity, by these rules one might exactly produce any colour proposed, by mixing the several materials in their just proportions. But though these particulars cannot be known to sufficient exactness for this purpose, besides the tediousness that would be in practice, to measure the colours according to their exact proportions; yet the knowledge of this theory may be of great use in painting. Suppose, for example, a pallet is provided with the several colours at  $a, b, c, d, e$ ; suppose for instance at  $a$ , carmine; at  $b$ , orpiment; at  $c$ , pink; at  $d$ , ultramarine; at  $e$ , smalts; and had occasion to make a broken green, such as should be placed at  $x$ . Then see that it does not lie a great deal out of a line drawn through  $c$  and  $d$ ; therefore conclude, that mixing the colours  $c$  and  $d$  will come very near to what is wanted: but because  $x$  is nearer to the centre  $O$  than the line  $cd$ , having brought the tint as near as possible to what is wanted, suppose to  $z$ ; then look from  $z$  cross  $x$  for some colour opposite to  $z$ , to break the tint with, and you will find the nearest to be  $a$ ; therefore by mixing of the colour  $a$ , brings the composition to the tint you have occasion for. If the colour  $a$  carries the tint too much towards the line  $OD$ , put a little more of the colour  $d$ , which brings it into the right place: or having got the tint  $z$ , you might have broken it with white, whose place is at the centre  $O$ : or putting a greater proportion of the colour  $d$ , instead of  $a$ , you may afterwards break the tint by means of the colour  $b$ . And in the same manner, by a mere inspection of this scheme, we might immediately see the method requisite to be pursued in order to form any colour, however difficult it might be to form it without such assistance. It will be of great use to painters if thoroughly understood, and by making themselves acquainted with the nature and properties of the colours they use, they may attain a perfection in colouring which they might otherwise have sought for in vain.

**COLOURING**, among painters, is one of the most essential branches of their art, which is generally divided into three parts, design, composition, and colouring.

**COLT**, in zoology, the same with foal, or the young of the horse kind:

**COLUBER**, in zoology, a genus of serpents belonging to the class of amphibia. The characters are these: they have a number of scuta, or hard crusts, on the belly; and scutellæ, or scales, on the tail. Linnæus enumerates no less than 97 species under this genus, distinguished solely by the number of scuta and scutellæ. For the sake of brevity, we shall give the numbers in

figures, the first denoting the number of scuta, and the second the number of scutellæ, thus, 140-22.

**COLUMBINE**, *Aquilegia*, in botany. See the article **AQUILEGIA**.

**COLUMN**, in architecture, a round pillar made to support and adorn a building.

Columns are different in the different orders of architecture; as the Tuscan, the Dorick, the Ionick, the Corinthian, and the Composite. See **TUSCAN**, &c. *Order*.

**COLUMN**, among printers, signifies half a page, when the page is divided into two parts, from top to bottom.

**COLUMN**, in military affairs, a long, deep file of troops or baggage.

**COLURES**, in astronomy and geography, are two great circles supposed to intersect each other at right angles in the poles of the world, and to pass through the solstitial and equinoctial points of the ecliptick; the one called the solstitial, and the other the equinoctial colure.

**COLUTEA**, bladder fœna, in botany, a genus of plants, ranged by Linnæus among the diadelphia dicandria class, producing papilionaceous flowers. The common sort is a shrub, which grows naturally in Austria, in the south of France and Italy, from whence the seeds were originally brought to England. This flowers in June or July, and the seeds ripen in autumn; they are propagated by seeds, and are very common in shrubberies, &c.

**COMA**, or **COMA-VIGIL**, among physicians, a preternatural propensity to sleep.

**COMA BERENICES**, in astronomy, a constellation of the northern hemisphere, situated between Virgo, Bootes, Canes venatici, and near the Lion's tail.

This constellation comprehends, according to Ptolemy's catalogue, 3 stars, according to Tycho's 13, and according to Mr. Flamsteed's 43.

**COMBINATION**, properly denotes an assemblage of several things two by two.

**COMBINATION**, in mathematicks, is the variation or alteration of any number of quantities, letters, sounds, or the like, in all the different manners possible.

F. Truchet, in the memoirs of the French Academy, shews that two square pieces, each divided diagonally into two colours, may be combined 64 different ways, so as to form so many different kinds of chequer-work; which appears surprising enough, when one considers that two letters or figures can only be combined twice. See the article **CHANGE**.

F. Merfenne gives us the combinations of all the notes and sounds of musick as far as 64; the sum whereof amounts to 90 figures or places.

**COMBINATORY**, in a general sense implies something belonging to combination.

**COMBINATORY Distillation** is a method much practised by our distillers in rectifying spirits, and consists in mixing with the spirits committed to the still several ingredients, particularly alkaline salts, and others of that kind capable of absorbing part of the water with which the spirits are blended, and giving them a good flavour.

**COMBUST**, an appellation given to a planet, when in conjunction with, or not distant above eight degrees and thirty minutes from the sun; some restrain the term combust, to the distance of half their disk.

**COMEDY**, a dramattick piece representing some agreeable or diverting transaction, either real or fictitious, and calculated for the amusement and instruction of the audience.

Comedy is often considered as having parts of quality and quantity. The four essential parts of quality are, the fable, the manners, the sentiments, and the diction. To which two others, relating only to the representation, are added, viz. the musick and the decorations. No comedy can be written without having these four essential parts.

The parts of quantity are also four: 1st. The entrance, which only makes us acquainted with the characters, and proceeds very little into any part of the action. 2dly, the working up of the plot, where the play grows warmer, and the design or action of it is



drawing on, and we see something promising. 3dly, The full growth of the plot, which we may call properly the counter turn, because it destroys the expectation, and embroils the action in new difficulties, leaving us far distant from the hopes in which it found us. 4thly, The discovering or unravelling of the plot, where we see all things settling again on the first foundation. The obstacles which hindered the action or design of the play being once removed, it ends with the resemblance of truth and nature, and the audience are satisfied with the conduct of it.

From whence comedy had its origin cannot be determined. Aristotle says we know little or nothing of comedy, as little regard was paid to it at first in comparison of tragedy. However, though tragedy was sooner refined, yet it is probable that some rude attempts in comedy were more ancient; because it seems natural to imagine, that mankind, on gathering in the fruits of the earth, and receiving the other blessings of providence, should be excited with sentiments of joy, affected with an innocent gaiety, and led on to some festival sports, before they could think of writing poems upon the miseries and misfortunes of other men; and because a life plain, and without shew, was more ancient than state and magnificence.

COMET, an opaque, spherical, and solid body like a planet, performing revolutions about the sun in elliptical orbits, which have the sun in one of the foci.

The ancients were divided in their opinions concerning them; some considering them as wandering stars; others, as meteors kindled in the atmosphere of the earth, subsisting for a time, and then dissipated: others looked upon them as prodigies. But it is put beyond doubt by the more accurate observations of late astronomers, that they are a kind of planets. That they are not meteors, is obvious; for if they were, they could not bear that vast heat which some of them in their perihelia receive from the sun. The great comet which appeared in the year 1680, was within a sixth part of the sun's diameter from its surface, and therefore must require a degree of heat intense beyond all imagination.

But that comets are not only above the air, but also beyond the moon, is plain; because comets seen from distant places, are observed to be at the same distance from a fixed star which is near them. As for example, the comet which Tycho Brahe observed at Uraniburg, was likewise seen by Hagecius at Prague in Bohemia at the same time; which two places differ six degrees in latitude, and are nearly under the same meridian, and both measured the distance of this comet from the star we call the vultur; that is, how much it was below it towards the horizon, for both the vultur and comet were in the same vertical circle, and both observers found their distances the same, and consequently they both viewed the comet in the same point of the heavens; which could not be, unless it had been higher than the moon.

The figures of comets are observed to be very different for some of them throw forth beams like hair every way round them, and these are called hairy comets. Others again have a long beard, or rather a fiery tail, opposite to the region in which the sun is seen; and they are called bearded, or comets with tails. Their magnitude has also been observed to be very different; many of them without the hair, appear no bigger than stars of the first magnitude. But some authors have given us an account of others which were much greater: such was that which appeared in the time of the emperor Nero, which, as Seneca relates, was not inferior in magnitude to the sun itself. In like manner, the comet which Hevelius observed in the year 1652, did not seem to be less than the moon, though it had not so bright a splendor; for it had a pale and dim light, and appeared with a dismal aspect. Most have a dense and dark atmosphere surrounding their bodies, which weakens and blunts the sun's rays; but within it, appears the nucleus or solid body of the comet, which when the clouds are dispersed, gives a splendid and brisk light.

The particulars in which comets differ from planets

are, that they move in various directions, some the way with the planets, others the contrary; neither are their motions confined within the zodiack, their orbits admitting of any inclination to the ecliptick whatever. And the eccentricity of their orbits is so very great, that some of the comets perform the greatest part of their motion almost in right lines, tending in their approach to the sun almost directly towards it, after which they pass it; and when they leave it, march off again nearly in a right line till they are out of sight, as if they were hastening back to the fixed stars. As they approach the sun their motion grows proportionably swifter; for they describe equal areas in equal times about its centre as the planets do. Hence it is, that when they are in their perihelia, their motion is immensely swifter than when they are in their aphelia.

This will better appear from the following demonstration. Let S (*plate XXI. fig. 2.*) be the sun, AP DG the elliptick orbit of a comet, TCE the orbit of the earth. If we should suppose the semi-axis of the comet's orbit to be 100 times greater than the semi-axis of the earth's orbit, or, which is the same, than its mean distance from the sun, that comet would not complete its revolution in less than 1000 years; for the squares of the periodical times of the earth and comet, must be as the cubes of their mean distances from the sun, and the comet becomes visible only for that part of its period, wherein it descends towards the sun and approaches near the earth, as in F, and then after it has passed its perihelion, constantly rising higher from the sun about G, it will begin to vanish and will not be visible without a telescope. If the aphelion distance be to the perihelion as 1000 is to one, the velocity of a comet in the perihelion, will bear the same proportion to the velocity at the aphelion. For the area ASB, must be but equal to the area PSD, if the arches AB and PD be described by the comet in equal times, and then the arch PD must be greater than AB, in the same proportion as AS is greater than PS. This is the proportion of their absolute velocities. But their angular velocities about the sun, are in a duplicate proportion of these distances, or as 1000000 to 1. So that while the comet in its perihelion describes one degree with its angular motion, where it ascends to its aphelion, it will describe in an equal time but  $\frac{1}{1000000}$  of a degree. Hence then is seen the cause why comets are visible to us for so short a time, and when they disappear, why they are so long before they visit us again. This also destroys the objection against the return of comets drawn from the rarity of their appearance.

As the elliptick orbit of a comet is so very eccentric, that portion of it wherein it becomes visible to us, may pass for a parabola. By considering, therefore, that portion as a piece of a parabola near its vertex, the calculation of their motions becomes much easier; and upon that hypothesis Dr. Halley has constructed and calculated a table, by which, whenever a new comet shall appear, it may be determined whether it be any of those which have yet appeared, and consequently its period, and the axis of its orbit be determined, and its return foretold. From this table, as well as from the observations of astronomers, it seems probable, that the comet which appeared in the year 1682, was the same which was seen before in 1607 and 1531, and likewise again in the year 1758, after a period of about 151 years. And that the great comet which appeared in the year 1680, was the same seen in the time of king Henry I. in 1106, and in 531, and in the forty-fourth year before Christ, when Julius Cæsar was murdered. If so, then the period of this comet is about 575 years. There are between twenty and thirty that have appeared since the year 1337, but no two appearances seem to belong to the same comet, except those above-mentioned.

The phenomena of comets which arise from the motion of the earth, agree in a great measure with those of the planets. For instance, those comets which move according to the order of the signs, a little before they disappear, become more than ordinarily slow and retrograde, if the earth at that time be between them and the sun, but more than ordinary swift, if the earth



be on the opposite side: and the reverse of this happens to those which move contrary to the order of the signs. This is occasioned by the motion of the earth; for when the earth goes the same way with a comet, but with a swifter motion, the comet seems retrograde; when with a slower motion, the comet's apparent motion becomes slower; and when the earth moves the contrary way, it becomes swifter. See the articles RETROGRADE, and PLANET.

Few comets are to be seen in their access to the sun, but in their recess appear with long fiery tails, pointing directly, or nearly so, towards that part of the heavens which with respect to the comet is opposite to the sun. Some are visible before they reach the sun, and begin to put forth their tails, which at first are short and thin, seldom exceeding fifteen or twenty degrees in length, but grow longer and denser as the comet comes nearer the sun. If the comet passes very near the sun, it then sends forth fiery beams of light every way. After this it puts forth a tail forty, fifty, or sixty degrees long, which as the comet recedes farther from the sun, continually diminishes both in length and splendour; but is larger and longer at any distance in its recess from the sun, than at an equal distance in its access to it.

In order to account for the formation of the tails of comets, some have supposed that the heads of comets are transparent, and that their tails are no other than a beam of the sun transmitted through them. But were the heads of comets transparent, they themselves would be scarcely visible. Others, that they arise from the refraction of the rays of light in their way from the comet to us. But if so, then both the planets and fixed stars ought to have tails also. Kepler ascribed the ascent of the tails to the rays of the sun carrying the particles of the comet's atmosphere with them; that is, impelling them into the regions opposite to it. But we have no instance of any thing in nature like this: it is therefore an hypothesis that cannot be supported. Sir Isaac Newton thinks the great splendour and length of the tails, arises from the heat which the sun communicates to the comet as it passes near it. As the ascent of the smoke in a chimney is owing to the impulse of the air with which it is intangled, in like manner, says he, the tail of a comet may rise from the atmosphere thereof into those parts which are opposite to the sun, being carried up by the æther about the comet, rarefied to a very great degree by the heat thereof. This opinion is greatly corroborated by the appearance of the tails; for when accurately observed, they are found not to rise always in a direction precisely opposite to the sun, but to deviate or incline a little from thence towards those parts which the comet has lately left; and not only so, but to be bent into a certain curvature, the extremities of the tails deviating from the true opposition more in proportion than the other parts; and to be more dense, seemingly, and better defined on the convex than on the concave side. And further, that the longer the tail is, the more sensible is the curvature, as being the greatest at the greatest distance from the body of the comet. Upon these accounts Sir Isaac thinks it evident, that the phenomena of the tails of comets depend on the motion of their heads, and that the heads furnish the matter which forms the tails.

Mr. Rowning, who is not satisfied with Sir Isaac's opinion, accounts for the tails of comets in the following manner. It is well known, says he, that when the light of the sun passes through the atmosphere of any body, as the earth, that which passes on one side, is by the refraction thereof made to converge towards that which passes on the opposite one; and this convergency is not wholly effected either at the entrance of the light into the atmosphere, or at its going out; but that beginning at its entrance, it increases in every point of its progress. It is also agreed, that the atmospheres of the comets are very large and dense. He therefore, supposes, that by such time as the light of the sun has passed through a considerable part of the atmosphere of a comet, the rays thereof are so far refracted towards each other, that they now begin sensi-

bly to illuminate it, or rather the vapours floating therein, and so render that part which they have yet to pass through visible to us; and that this portion of the atmosphere of a comet thus illuminated, appears to us in the form of a beam of the sun's light, and passes under the denomination of a comet's tail. This is the hypothesis of Mr. Rowning: how well it answers the phenomena of the tails, may be seen in his system of Natural Philosophy, part IV. cap. 11.

To determine the apparent place and course of a COMET: One method by which astronomers investigate them is this. They observe what two stars are directly one on one side of the comet, and the other on the other; which is done by holding up a thread between the eye and the two stars, and extending it in such manner, as that it shall seem to cross each star: then they look out two other stars in such situation also, that the comet shall appear in a line that passes from one to the other which are found as before. Then they extend a thread upon the celestial globe from one of the two first stars to the other; and another thread from one of the two last stars to the other: and the point on the globe where the threads cross, is the apparent place of the comet at the time the observation was made. This they do daily, and so trace out its apparent course in the heavens.

COMETARIUM, a curious machine, calculated to represent the motion of a comet about the sun.

The construction of the parts of this machine with the rationale is as follows, taken from Mr. Martin's lectures: When the lid is taken off the box, the internal parts appear as in (*plate XXI. fig. 3.*) NO and QT are two elliptick wheels turning each other about the foci I and S, by means of a cat-gut string in a groove on their edges, crossing at K. These oval wheels are fixed on arbors or axes, which pass through the same focus S and I in each; the oval NO is moved by the circular wheel I, fixed also upon the same axes, but above it upon the bar or long piece GV; which wheel is itself moved by another equal wheel G, and that by an endless screw turned by a winch on the outside of the box; all which is evident in the figure.

The perimeter of the oval QT, where it touches that of NO, will have a velocity always proportional to the distance from I; that is, in the points K, 4, 3, 2, 1, &c. The velocities will be as the lines IK, 14, 13, 12, 11, &c. which we consider as levers acting upon and moving the oval QT in those points. Now if the ovals are such that IK is to SV, or IK to Ir, as 6 to 1, then will the point K have six times the velocity turned by the lever IK, as the point V will have when it has made  $\frac{1}{2}$  revolution, or is come under the point S, where it is turned by the lever Is, than in the situation IS.

If we take  $SP = SK = Is$ , and upon the point s, S, s, as foci, describe the ellipsis PLIM, that will represent the orbit of the comet, or the figure of the groove on the lid of the box, in which a round brass ball, representing the comet, is made to slide along on a piece of wire, called the radius vector, fixed at one end into the top of the arbor at S, where we suppose the sun to be, and is accordingly represented by a silver plate at top.

The place of the comet at P is called the perihelion, as being there nearest the sun; as I is its aphelion or point of greatest distance. Since  $SP = SK$ , the velocity of the comet will be in the point P equal to that of the point K; and were the comet's aphelion at s, its velocity then would be equal to that of the point V, when under s, viz. six times less than before; but since the comet's aphelion is at I, and since the greater arch described in the same time must have a greater velocity, the velocity of the comet at I will be about  $\frac{1}{2}$  of that at P.

If the ellipsis on the lid of the box be divided into one hundred parts, to shew the anomaly of the comet, and about the axis of the wheel G be placed a circle EF, divided into equal parts, representing the years or period of the comet, with a proper index pointing to these divisions, the instrument will shew the several particulars relating to the theory of the elliptick motions, whether of a planet or comet.

COMITIA,



COMITIA, in Roman antiquity, an assembly of the people, either in the Comitium or Campus Martius, for the election of magistrates, or consulting on some points of importance.

COMITIUM, among the ancient Romans, was a large hall in the forum, where the comitia were often assembled.

COMMA, among grammarians, implies a stop or character, serving to indicate a short pause, and divide the members of a period. It is marked thus (,).

COMMA, in music, an interval equal to the difference of the tones major and minor.

COMMANDING *Ground*, in military affairs, implies an eminence that overlooks any post or fortification.

COMMANDRY, a benefice belonging to some military order.

COMMENDAM, implies a benefice enjoyed by some clergyman, who is at the same time in possession of another.

COMMENSURABLE, among mathematicians, signifies any quantities, lines or numbers, as are measured by one and the same common measure.

COMMENTARY, or COMMENT, implies an illustration of the difficult passages in a writer.

COMMERCE, the buying, selling, and bartering merchandize, in order to obtain a competent profit.

Commerce is the most solid foundation of civil society, and the most necessary principle to unite all men of whatever country or condition. It is the bank of plenty to every part of the world: by it the mercantile people of nations seem to be one body incorporated; and the riches of every trading town and place circulate into the hands of the poor, industrious, and distant traders. By this our necessities, conveniences, and pleasures are supplied from the most distant shores of the E. and W. Indies.

Though it is impossible to trace commerce to its first beginning, yet we know from undoubted records, that the Ishmaelites and Midianites carried on a great commerce by caravans with Egypt in the days of Jacob for spices and other commodities bought in Gilead.

This commerce which at first was carried on by land-carriage, as the world grew more populous, introduced water-carriage or navigation. Thus the Egyptians on the Red-sea, and the Phœnicians on the Mediterranean, divided the commerce of the E. and W. among themselves. The Egyptians imported whatever they could collect from the Indian shore, and the Phœnicians carried their merchandize to all distant places bordering on the sea: and the early flourishing state of Tyre and Sidon, though on a poor narrow spot, is a sufficient proof to what height of glory, power and wealth, a nation can raise itself only by trade.

For they became the emporium for all the earth, and, being supplied with a good fleet of merchantmen built of wood from Mount Libanus passed by the streights of Gibraltar into the western ocean; this not only improved their commerce and navigation, and enriched the Tyrian merchants, but drew great numbers of strangers to Tyre, with a view to make their fortunes by trade, so that they were soon able to send a colony that built Carthage, which vied with it in traffick, and in a short time surpassed it exceedingly in extent of dominions and military expeditions.

Trade gave it birth; trade enlarged it; and trade put it in a condition to dispute the empire of the world for many years with Rome. Nor had they ever been overcome, had they not ambitiously preferred the glory of arms to that of trade, diminished the number of their traders to supply troops and recruit armies, turned their merchant-ships into transports, and elected officers and generals of armies out of the wisest and most successful merchants.

Again, Alexandria rose to such a degree by commerce after the ruin of Tyre and Sidon, that they were soon forgotten. Ptolemy Philadelphus employed four thousand merchantmen in this port, under the convoy of one hundred and twenty sail of large armed galleys; and the

customs of this port amounted yearly to more than 3,000,000l. sterling.

Though Egypt sunk from an empire into a province, Alexandria preserved her commerce; and, when Rome itself was obliged to submit to Constantinople, Alexandria still remained the centre of what little trade was then left; till Venice, taking advantage of the barbarous maxims of the Mahometan monarchs, drew to herself the profits of the Indian trade, and became the common mart of all nations. This having made her mistress of the sea, enabled her not only to extend her dominions, but to ruin the Genoeſe, who endeavoured to supplant that profitable commerce.

However, about the middle of the thirteenth century, several maritime towns in Germany, of which Lubeck, Hamburg, and Bremen, still remain, confederated, and carried on an extensive commerce to several parts of the world, till their great riches and power drew upon them the envy of some, and jealousy of other states, which, joined to the discoveries of the new world, was the cause of their decay.

Portugal, having discovered the rout to the E. Indies, by the way of the Cape of Good Hope, and by that means settled a more extensive commerce, grew up, in a short space, to be one of the richest powers in Europe, gained prodigious dominions in Asia and Africa, and raised a naval power superior to any thing that had been seen for many preceding ages.

Spain about the same time settled a commerce in the new Indies discovered by Columbus; and in the South Seas and Spice-islands, by Ferdinand Magellan.

Each of these nations reaped great profits from their new discoveries: but the naval power of Portugal falling under the Spaniards, by the death of Cardinal Henry king of Portugal, without issue, the Portuguese commerce was entirely ruined: and had not the Spanish pride forced other nations, in their own defence, to apply closer to navigation, they, by this favourable juncture, had monopolized the trade of the whole world to themselves, and maintained the universal dominion of the seas.

Of all the nations in Europe, the English and Dutch, after surmounting very great difficulties, have now the superiority in point of trade. Holland, by the favourable reception it gives to strangers, and the refuge it affords religionaries, enjoys a vast trade. As to England, the convenience and multitude of its ports, the goodness of its commodities, industry and ingenuity of its workmen, &c. have established its trade, so as to admit of no rival but the Dutch. England trades in all parts of the world; nor does any nation drive such a commerce as she does with her own commodities; for the Dutch trade chiefly consists in the transportation of foreign goods from one country to another. The foreign trade is regulated chiefly at London, by several companies of merchants; some empowered by royal charter to make such regulations for the good of their respective trades, as they shall think proper; others by private associations. See the article COMPANY.

COMMUNITION, the act of breaking, grinding or reducing a body into very small particles.

COMMISSARY, in military affairs, an officer appointed to inspect the musters, stores and provisions, and to provide all things necessary for the army.

COMMISSIONER, a person authorized by commission, letters-patent, or other lawful warrant, to examine some affair, execute some office, &c.

COMMITMENT, in law, implies the sending a person to prison, charged with some crime, by warrant.

COMMITTEE, a select number of persons, to whom the more particular consideration of some matter is referred; and who are to report their opinion to the court, &c. of which they are members.

COMMODITY, a general name for all sorts of wares and merchandize.

COMMODORE, a general officer in the marine, invested with the command of a squadron of ships, detached on any particular occasion. His ship is distinguished from the others by a broad red pendant, forked, and tapering to the outer end.



**COMMON**, something that belongs to all alike; in contradistinction to proper, peculiar, &c.

**COMMON-LAW**, that body of rules received as law in England, before it was altered by acts of parliament.

**COMMON-PLACE-BOOK**, a register of every thing worthy of being noted in the course of a person's study, so disposed, that among a multiplicity of subjects, any one may be readily found.

**COMMON PLEAS**, one of the king's courts, formerly moveable, but now held constantly in Westminster-hall.

In this court civil causes are tried, according to the strict laws of the kingdom. The chief judge is called the Lord chief justice of the common-pleas, &c. is assisted by three other judges.

**COMMON**, in husbandry, implies a piece of ground common to this or that town, parish or lordship.

**COMMON INTENDMENT**, in law, the commoning of any passage, without straining it to any foreign, remote, or precarious sense.

**COMMONS**, or *House of Commons*, one of the branches of the English legislature. See **PARLIAMENT**.

**COMMONWEALTH**, the same with republick. See the article **REPUBLICK**.

**COMMUNICATION**, in a general sense, the act of imparting something to another.

**COMMUNICATION** is also used for the connection of one thing with another, or the passage from one place to another: thus a gallery is a communication between two apartments.

**COMMUNICATION of Idioms**, in theology, the act of imparting the attributes of one of the natures in Jesus Christ to the other.

It is by this communication that we say, God suffered, and died, &c. which, strictly speaking, is only understood of the human nature; and is wholly founded on the union of the two natures of the person of Christ.

The Lutherans carry the communication of idioms so far as to say, that Jesus Christ is not only in his Divine nature, and by reason of his Divine person, but also, really and properly, in his humanity, immortal, immense, &c.

**COMMUNICATION of Motion**, in philosophy, is the action of a moving body, whereby a body at rest is put in motion, or a body already in motion is accelerated.

*The Laws of Communication of Motion.* Sir Isaac Newton demonstrates, that action and re-action are equal and opposite; so that one body striking against another, and thereby occasioning a change in its motion, does in itself undergo the same change in its own motion, the contrary way.

Hence a moving body striking directly against another at rest, the one loses just as much of its motion as it communicates to the other, and they will proceed with the same velocity as if grown into one mass.

Therefore, if the body in motion be triple that at rest, against which it strikes, it will lose a fourth part of its motion; and whereas, before it would run over, (v. g.) a line of 20 feet, in a given time, it will now only run over 15; that is, it will lose a fourth part of its velocity.

If a moving body strike another already in motion, the first will augment the velocity of the latter, but will lose less of its motion than if the latter had been absolutely at rest.

Thus, v. g. if a body in motion be triple of another at rest, and strike against it with 32 degrees of motion, it will communicate 8 degrees of its motion to the other, and retain 24 to itself. If the other had already 4 degrees of motion, the first would only communicate 5, and retain 27: since those 5 were sufficient, in regard to the inequality of the bodies, to make them proceed with equal velocity.

After the same manner may be determined the other laws of communication in bodies perfectly hard, and void of all elasticity. But all hard bodies, that we know of, have an elastick power, and the laws are different and much more intricate in elastick bodies.

If a body happen to decline out of the way, when moved by another, so as to leave a free passage to the body by which it was moved; yet that will only proceed with the velocity which it had after its communication with the other, not with that it had before. It being a

rule that every thing endeavours to persevere, not in the state wherein it was formerly, but in that wherein it was at that juncture: therefore, a body that has already lost part of its motion by its meeting with another, may still lose more by a second and a third, so as the length to become perfectly at rest.

Hence, first, if two unequal homogeneous bodies move in a right line with the same velocity, the greater must preserve its motion longer than the smaller; for the motions of bodies are as their masses, but each communicates of its motion to the circumjacent bodies which touch the surface; the largest body therefore, though it has more surface than the smaller, yet, having less in proportion to its mass or quantity of matter than the smaller, will lose a less portion of its velocity every moment than the smaller.

As for example, suppose a cube A to be two feet every way, and another B, one foot, the surfaces here will be as 4 to 1, but their masses as 8 to 1. If therefore those bodies move with the same velocity, the cube A will have 8 times as much motion as the cube B, the quantity of motion ever being as the quantity of matter; that each of them therefore may become quiescent at the same time, the cube A must lose 8 times as much motion as the cube B; but that is impossible; because, as their surfaces are to each other as 4 to 1, the bodies against which they strike will be only as 4 to 1. Therefore, when the cube B is become perfectly quiescent, A will retain half its motion.

Hence, secondly, we see the reason, why any long body, as a dart thrown longwise, continues its motion longer than when thrown transversely, it meeting fewer bodies in the way to communicate its motion to in the one case than in the other.

Hence, also, thirdly, if a body be moved almost wholly within itself, so as to communicate little of its motion to the ambient bodies, it must continue its motion a long time: thus, a smooth brass ball of half a foot diameter, placed on a slender smooth axis, with a very weak impulse is found to revolve for the space of 3 or 4 hours.

For the rules of communication of motion of elastick bodies. See **ELASTICK**.

*Lines of COMMUNICATION*, in military matters, trenches made to continue and preserve a safe correspondence between two forts or posts; or at a siege, between two approaches, that they may relieve one another.

**COMMUNION**, in divinity, signifies a number of persons united in the same doctrine and discipline.

**COMMUNION**, is also used to signify the act of communicating in the sacrament of the Eucharist, or Lord's Supper.

**COMMUNION-TABLE**, that whereon the elements of bread and wine, used in the communion, are placed.

**COMMUNITY**, a society of men, living in the same place, under the same laws, the same regulations, and the same customs.

*Angle of COMMUTATION*, in astronomy, is the angular distance between the sun's true place, seen from the earth, and the place of a planet reduced to the ecliptick.

**COMPACT**, in physiology, implies close, heavy, having few pores.

**COMPANY**, in a general sense, denotes a number of people met together upon the same design.

**COMPANY**, in commerce, signifies a society of merchants, mechanicks, or other traders, joined together in one common interest.

The trade of Great Britain with foreign nations is carried on, partly by companies, and partly by private merchants. The most considerable companies are the nine following:

1. The most ancient trading company in Britain is that which goes now by the name of the *Hamburgh company*. They were originally called merchants of the staple, and afterwards merchants-adventurers. They were first incorporated in the reign of king Edward I. anno 1296, and obtained leave of John duke of Brabant, to make Antwerp their staple or mart, where the woollen manufactures at that time flourished. The staple was afterwards removed to Calais, and from that



to other places : and in the reign of queen Elizabeth to Hamburg, where it still continues. But private merchants are now allowed the privilege of this trade, upon paying a very small sum to the company.

2. The company next incorporated was that of the Russia merchants, in the reign of queen Mary, who were impowered to trade to all lands, ports, and places in the dominions of the emperor of Russia. This company is not very considerable at present ; the trade to these places being mostly carried on by private merchants, who are allowed that privilege, on paying five pounds sterling.

3. The next is the Eastland company, formerly called merchants of Elbing, a town in Polish Prussia, being the port they principally resorted to, in the infancy of their trade. They were incorporated in the 21st of queen Elizabeth, and impowered to trade to all places within the Sound, except Narva, the only Russian port at that time in the Baltick. This company, like the former, is now inconsiderable, the trade to Norway and Sweden being laid open to the private merchants by act of parliament.

4. The Turkey, or Levant company, was also erected in the reign of queen Elizabeth, and their privileges confirmed and enlarged in the reign of king James I. being impowered to trade to the Levant, or eastern part of the Mediterranean ; particularly to Smyrna, Aleppo, Constantinople, Cyprus, Grand Cairo, Alexandria, &c. This trade is also now laid open to private merchants, upon paying a small consideration.

5. The E. India company comes next, which was incorporated about the 42d of queen Elizabeth, anno 1600. and impowered to trade to all countries to the eastward of the Cape of Good-Hope, exclusive of all others : but about the year 1698, application being made to the parliament by private merchants, for laying this trade open, an act passed empowering every subject of England, upon raising a sum of money for the supply of the government, to trade to these parts. Upon which a great many subscribed, and were called the new East-India company : but the old company being masters of all the forts on the coast of India, the new company found it their interest to unite with them, and trade with one joint stock, and have ever since been stiled the United East-India Company.

6. The Royal African-company was first erected in the year 1661, with an exclusive privilege to trade from Cape Blanc, on the coast of Africa, in 20° north latitude, as far as the Cape of Good Hope. But this trade is now laid open by act of parliament.

7. The Canary company was also incorporated in the reign of king Charles II. in the year 1664, and impowered to trade to the seven islands, anciently called the Fortunæ, and now the Canary islands.

8. Hudson's-Bay company were incorporated about the latter end of king Charles II.'s reign, for trading to Hudson's Bay and the places adjacent.

9. The last company is that of the South-Sea, established by act of parliament in the ninth year of queen Anne. Their grant is very extensive, as they have an exclusive trade to and from all the lands and kingdoms on the east of America, from the river Oroonoko to the furthestmost part of Terra del Fuego, and thence to the nethermost part of America on the west side.

COMPANY, in military affairs, a small body of foot commanded by a captain, who has under him a lieutenant and ensign.

COMPARATIVE, an epithet applied to some substantive, to denote that the subject is to be considered in comparison to some other.

COMPARATIVE *Anatomy*, the anatomy of brutes, whose parts are compared with those of a human subject, in order to elucidate the latter.

COMPARATIVE *Degree*, among grammarians, that which expresses the medium between the positive and superlative degrees.

COMPARISON, the consideration of two persons, things, or ideas, in relation to one another ; or the method of illustrating one thing by comparing it with another to which it bears a manifest relation and resemblance.

COMPARTITION, in architecture, implies the graceful and convenient disposition of the whole plan or ground plat of an edifice, into apartments, rooms, offices, &c.

COMPARTMENT, a design composed of different figures properly disposed.

COMPASS, an instrument used by navigators and seamen, for determining the ship's course at sea.

This instrument consists of a needle touched with a loadstone, fixed on a card, and fastened on the point of a sewing-needle fixed in a box. The card, which is calculated to represent the horizon, is a circle divided into thirty-two equal parts, by lines drawn from centre to the circumference, called points or rhumbs. The intervals between the points are also subdivided into equal parts, called degrees, three hundred and sixty of which complete the circle ; and consequently the distance or angle comprehended between any two rhumbs is equal to 11°. 15'. The four principal rhumbs are called the cardinal points, and derive their names from the places to which they tend, viz. the two which extend themselves under the meridian, opposite to each other, pointing to the north and south, are called the north and south points ; that which is towards the right hand as we look north, is termed east, and its opposite the west point. The names of all the inferior ones are compounded of these, according to their situation. Along the north and south line is fixed a steel needle, which being touched by the loadstone, acquires a certain virtue that makes it hang nearly in the plane of the meridian, and consequently determine the direction of the other points toward the horizon.

The compass being of the utmost importance to the purposes of navigation, it is reasonable to expect that the greatest attention should be used in its construction, and every attempt to improve it carefully examined, and adopted, if proper. Great errors and irregularities, however, have been found incident to the construction of common compasses, arising from the shape of their needles, by which they have not only turned from their due direction, but from that of each other.

To remedy these inconveniencies, the learned Dr. Knight was induced to contrive a new sea-compass, which is now used aboard all our vessels of war. The needles of the other instruments were generally composed of two pieces of steel wire, bent in the middle, and approaching each other towards the ends, where they meet. Others were made of one piece of steel of a spring temper, and broad towards the ends, but tapering towards the middle ; but the needle in Dr. Knight's compass is quite straight, and square at the ends, and consequently has only two poles, although the curves are a little confused about the hole in the middle. Needles of this construction, after vibrating a long time, will always point exactly in the same direction ; and if drawn ever so little on one side, will return to it again, without any sensible difference.

We have given a perspective view of the whole compass, as it is hung, in order to prevent the motion of the ship from having any effect on the needle, on *plate VII. fig. 21.* and under the article *AZIMUTH COMPASS* we have described the instrument, with its additional apparatus, for finding the magnetical azimuth. But in order to render this article more complete, we have added, on *plate XXI. fig. 4, 5,* figures of the card and the pedestal that supports it. Figure 5 is the pedestal, containing a sewing-needle, fixed in two small grooves to receive it, by means of the collet C, in the manner of a port-crayon. The stem D is filed into an octagon, that it may be the more easily unscrewed. Figure 4 represents the card of the compass, with the needle NS, and its cap fixed upon it.

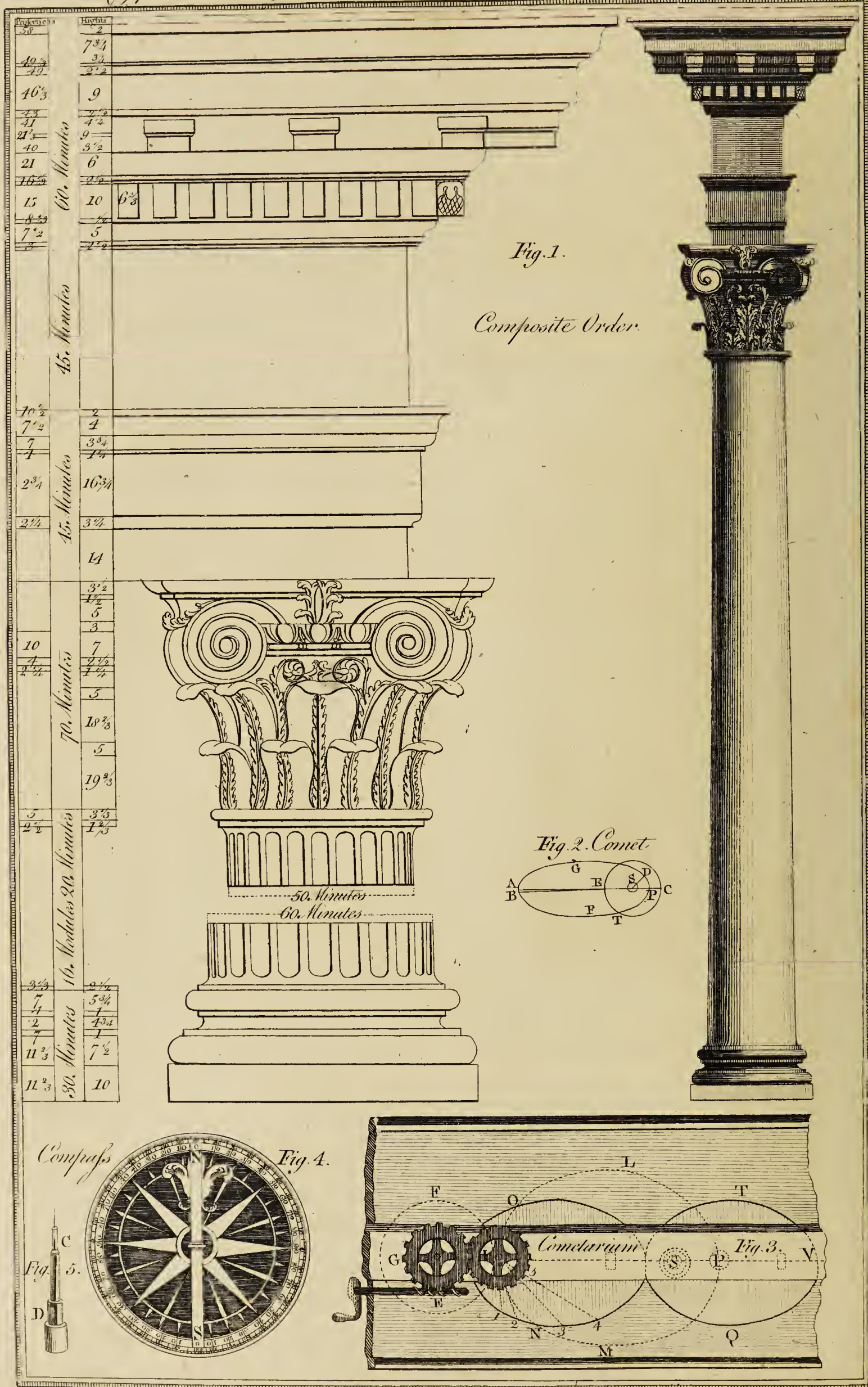
COMPASS DIALS, small horizontal dials fixed in brass or silver boxes for the pocket, to shew the hour of the day, by the sun's shadow, and the direction of the needle.

COMPASSES, or *Pair of COMPASSES*, the name of a well-known instrument, for describing circles, circular arches, measuring figures, and distances on maps, &c.











COMPENDIUM, the substance of any book, writing, or art, delivered in a short but conspicuous manner.

COMPLAINANT, in law, the same with plaintiff. See the article PLAINTIFF.

COMPLEMENT, in geometry, &c. implies the remainder of an arch, &c. subtracted from ninety degrees. Thus the complement of the altitude of an heavenly object is the difference between the altitude and ninety degrees.

COMPLEMENT of the *Course*, in navigation, the number of degrees, &c. the course wants of 90 degrees, or eight points, namely, of a quarter of the compass.

COMPLEMENT of the *Curtin*, in fortification, that part of the curtin which, being wanting, is the demigorge.

COMPLEMENT of the *Line of Defence*, the remainder of the line of defence, after you have taken away the angle of the flank.

COMPLEMENTS in a *Parallelogram*, the two lesser parallelograms, which are made by drawing two right lines parallel to each side of the figure, through a given point in the diagonal.

COMPLEX IDEAS, in logick, are such as are composed of several simple ideas.

Complex ideas are, however, often considered as single and distinct beings, though they may be composed of several simple ideas; as a body, a spirit, a horse, a tree, a flower: but when several of these ideas of different kinds are considered as distinct single beings, it is called a compound idea, whether those united ideas be simple or complex. So a man is compounded of a body and spirit: so mithridate is a compound medicine, because it is made of many different ingredients. Harmony is a compound idea, made up of different sounds united: so several different virtues must be united to make up the compound idea or character, either of a hero or of a saint.

Complex ideas, however compounded and re-compounded, though their number be infinite, and their variety endless, may be all reduced under these three heads, modes, substances and relations. The mind is wholly passive in the reception of all its simple ideas, but not so as to complex ones; since out of its simple ideas, as the materials and foundations of the rest, it forms complex ones, by combining several simple ideas into one compound one. *Locke, Watts.*

COMPLEXUS, in anatomy, a broad and pretty long muscle, extending along the back part of the neck. See the article MUSCLES of the *Human Body*.

COMPLICATION OF DISEASES, among physicians, implies that two or more diseases subsist at once in the same subject.

COMPOSITE Order, in architecture, is, strictly speaking, only a species of the Corinthian; and therefore retains, in a great measure, the same character. See plate XXI. fig. 1.

It does not appear that the ancients affected any particular form of entablature to this order. Sometimes the cornice is entirely plain, as in the temple of Bacchus; at others, as in the arch of Septimius Severus, it is enriched with dentils differing very little from the Ionic; and in the arch of Titus, there are both dentils and modillions; the whole form of the profile being the same with the Corinthian, as executed in the antiques at Rome.

The modern architects have varied more in this than in any other order, each following the bent of his own fancy.

The height of the composite column, and parts of the entablature, are the same with that of the Corinthian. The foot of the leaves of the capital ought not to project beyond the upper part of the shaft. The different bunches of leaves should be strongly marked; the sprigs which arise between the upper ones should be kept flat upon the vase; and the ornaments of the volutes must not project beyond the fillets that enclose them.

COMPOSITION, *Compositio*, in a general sense, the uniting or putting together several things, so as to form one whole, called a compound.

COMPOSITION of Ideas, an act of the mind, whereby it unites several simple ideas into one conception, or complex idea.

When we are provided with a sufficient stock of simple ideas, and have, by habit and use, rendered them familiar to our minds, they become the component parts of other ideas, still more complicated; and form, what we may call, a second order of compound notions. This process, as is evident, may be continued to any degree of composition we please, mounting from one stage to another, and enlarging the number of combinations.

COMPOSITION, in grammar, the joining of two words together; or prefixing a particle to another word, to augment, diminish, or change its signification.

COMPOSITION, in logick, a method of reasoning, whereby we proceed from some general self-evident truth, to other particular and singular ones.

In disposing and putting together our thoughts, there are two ways of proceeding, equally within our choice: for we may so propose the truths, relating to any part of knowledge, as they presented themselves to the mind, in the manner of investigation; carrying on the series of proofs in a reverse order, till they, at last, terminate in first principles; or beginning with these principles we may take the contrary way, and from thence deduce, by a direct train of reasoning, all the several propositions we want to establish.

This diversity, in the manner of arranging our thoughts, gives rise to the two-fold division of method established among logicians, the one called analytick method, or the method of resolution, inasmuch as it traces things back to their source, and resolves knowledge into its first and original principles. This method stands in contradistinction to the method of composition; or, as it is otherwise called, the synthetick method: for here we proceed by gathering together the several scattered parts of knowledge, and combining them into one system, in such a manner, as that the understanding is enabled distinctly to follow truth through all the different stages of gradations.

COMPOSITION, in music, the art of disposing musical sounds into airs, songs, &c. either in one or more parts, to be sung by a voice, or played on instruments.

COMPOSITION, in oratory, the coherence and order of the parts of a discourse.

To composition belong both the artful joining of the words, whereof the style is formed, and whereby it is rendered soft and smooth, gentle and flowing, full and sonorous; or the contrary; and the order, which requires things first in nature and dignity, to be put before those of inferior consideration.

COMPOSITION, in painting, consists of two parts, invention and disposition; the first is the choice of the objects which are to enter into the composition of the subject the painter intends to execute, and is either simply historical or allegorical.

The other very much contributes to the perfection and value of a piece of painting.

COMPOSITION, in pharmacy, the method of mixing and compounding medicines of different qualities, so that they may assist each other's virtues, or supply each other's defect.

COMPOSITION, in commerce, a contract between an insolvent debtor and his creditors, whereby the latter accept of a part of the debt in compensation for the whole, and give a general acquittance accordingly.

COMPOSITION, in printing, commonly termed composing, the arranging of several types, or letters, in the composing stick, in order to form a line; and of several lines ranged in order in the galley, to make a page; and of several pages, to make a form.

COMPOSITION of Motion, or Force, in mechanism, is an assemblage of several directions of motion resulting from powers acting in different, though not in opposite lines.

The change of motion is proportionable to the moving force impressed, and is made according to the right-line in which that force is impressed. It is well known, that if any force generate any motion, a double or triple force will generate twice or thrice as much. But the alteration in respect of the direction of the motion is a compound affair.



Let B be a body (*plate XXIII. fig. 2.*) impelled in the direction *bc*, by a body A, with such force as shall cause it to be uniformly over the space *bc*, in a second of time: at the same instant, let it receive a stroke by another body C, in the direction *bd*, with such a force as shall cause it to pass over the space *bd* in the same time.

Now, it is evident, the body B cannot move in both these directions, and therefore will not move in either, but in a direction compounded of both, which may be thus demonstrated. Draw *de* parallel to *bc*, then, though the action C prevents the body from proceeding in the right-line *be*, yet it can no ways alter its velocity of approaching to the line *ce*, in the given time, by virtue of the force impressed by A. At the end therefore of a second time, the body B will be somewhere in the line *bc*; by the same way of reasoning it will, at the end of the same time, be found somewhere in the line *ce*, parallel to *bd*, and therefore in the concurrence of both, in the point *e*. Its course then is the line *be*, which, by the first law of motion, is a right-line.

Hence appears the method of compounding a direct force *be*, out of any oblique force, *bc* and *bd*; and, on the contrary, of resolving any direct force *be* into two other oblique forces, by the two sides of a parallelogram; for the direct force will be represented by the diagonal, and the oblique by the sides *bd* and *be*.

COMPOST, in agriculture and gardening, an useful sort of manure, consisting of earth, dung, lime, clay, &c. according to the nature of the soil, well mixed and rotted together, till it forms one united mass.

COMPOUND, a general epithet given to any thing composed or made up of several particulars.

COMPOUND-FLOWER, that which is composed of several distinct florets. See FLOWER.

COMPOUND-INTEREST. See INTEREST.

COMPOUND-MOTION. See COMPOSITION of Motion.

COMPRESS, in surgery, a bolster of soft linen, frequently applied to cover a plaster, in order the better to retain the dressings and medicines in their proper places.

COMPURGATION, in law, a person who by oath clears or justifies the innocence of another.

COMPUTATION, the manner of estimating time, weights, measures, &c. Mathematicians generally use the word in the same sense as calculation.

CONCAVE, or CONCAVITY, in a general sense, implies the hollowness of any thing.

CONCAVE-GLASS, or LENS, one that is flat on one side, and hollow on the other. See LENS.

CONCENTRATION, in a general sense, implies the drawing things nearer to the centre: and hence it is applied by chymists to the evaporation of a fluid impregnated with salts; because as the fluid evaporates, the saline particles approximate nearer to one another.

CONCENTRICK, among mathematicians, implies something that has the same centre with another.

CONCEPTION, among physicians, implies the first formation of the embryo in the matrix of the parent.

CONCERT, or CONCERTO, in musick, a number of musicians performing the different parts of a piece of musick, composed in parts for that purpose.

CONCERT may be applied where the musick is only melody, that is, the performers play or sing all in unison; but it is more properly, as well as more usually understood, of harmony, or where the musick consists of divers parts, as treble, tenor, bass, &c.

CONCERTO for any instrument, as organ, harpsichord, violin, &c. is a piece of musick wherein any of these instruments has the greatest part, or in which the performance is partly alone, and partly accompanied by the other parts.

CONCESSION, in rhetorick, a figure whereby we grant something which might, however, cause some dispute, in order to obtain something which cannot fairly be denied.

This figure is something favourable in the beginning, but severe and cutting in the close; as Tully upon the Greeks,—I allow the Greeks learning and skill in many

sciences; sharpness of wit and fluency of tongue; and if you praise them for any other excellencies, I shall not much contradict you; but that nation was never eminent for tenderness of conscience, and regard to faith and truth.

Another sort of concession is, when, fearing we cannot obtain all we desire, we give up one part to carry the rest. When Dido despairs of prevailing with Æneas to settle with her at Carthage, she only intreats he would stay a little longer, to allow her some time to assuage her grief, and prepare herself to bear his departure.

The nuptials he disclaims, I urge no more;  
Let him pursue the promis'd Latian shore:  
A short delay is all I ask him now,  
A pause of grief, an interval of woe.

*Dryd. Virg. Æn. IV.*

CONCHA, in anatomy, the second or inward cavity of the aricle, or external ear. See EAR.

CONCHOID, in geometry, the name of a curve, given it by its inventor Nicomedes, and is thus generated.

Draw the right-line QQ (*plate XXV. fig. 7*) and AC perpendicular to it in the point E, and from the point C draw many right-lines CM, cutting the right-line QQ in Q, and make QM = QN, AE = EF, viz. equal to an invariable line: then the curve wherein are the points M, is called the first conchoid; and the other, wherein are the points N, the second; the right-line QQ being the directrix, and the point C the pole. And from hence it will be very easy to make an instrument to describe the conchoid.

The line QQ is an asymptote to both the curves, which have points of contrary flexion.

If QM = AE = *a*, EC = *b*, MR = EP = *x*, ER = PM = *y*; then will  $a^2 b^2 - 2a^2 bx + a^2 x^2 = b^2 x^2 - 2bx^3 + x^4 + x^2 y^2$ , expresses the nature of the second conchoid; and  $x^4 + 2bx^3 + y^2 x^2 + b^2 x^2 = a^2 b^2 + 2a^2 bx + a^2 x^2$ , the nature of the first; and so both these curves are of the third kind.

Sir Isaac Newton, in the latter part of his algebra, tells us, that this curve was used by Archimedes, and other ancients, in the construction of solid problems; he himself prefers it before other curves, or even the conick sections in the constructions of cubick and bi-quadratick equations, on account of its simplicity and easy description.

CONCINNOUS INTERVALS, in musick, are those that approach nearest to concords, and produce a good effect by heightening the pleasure resulting from the more essential parts.

CONCLAVE, the place where the Romish cardinals meet for the election of a new pope.

CONCLUSION, in logick, the consequence drawn from what has been asserted in the premises.

CONCOCTION, in medicine, the change of the food in the stomach into chyle.

CONCORD, in grammar, that part of construction called syntax, in which the words of a sentence agree; that is, in which adjectives are put in the same gender, number, case, &c. and verbs in the same number and person, with nouns and pronouns.

CONCORD, in musick, the relation of two sounds that are always agreeable to the ear, whether applied in succession or consonance.

CONCORDANCE, a kind of alphabetical index to words, &c. in the scriptures.

CONCRETE, in philosophy, implies a mixed body, or one made up of different principles.

CONCRETION, the joining or uniting together several small particles of a natural body into a sensible mass.

CONDENSATION, the act whereby a body is rendered more dense, compact and heavy.

CONDENSER, a particular kind of syringe, used to throw a large quantity of air into a given space.

CONDITIONAL, something not absolute, but subject to conditions.

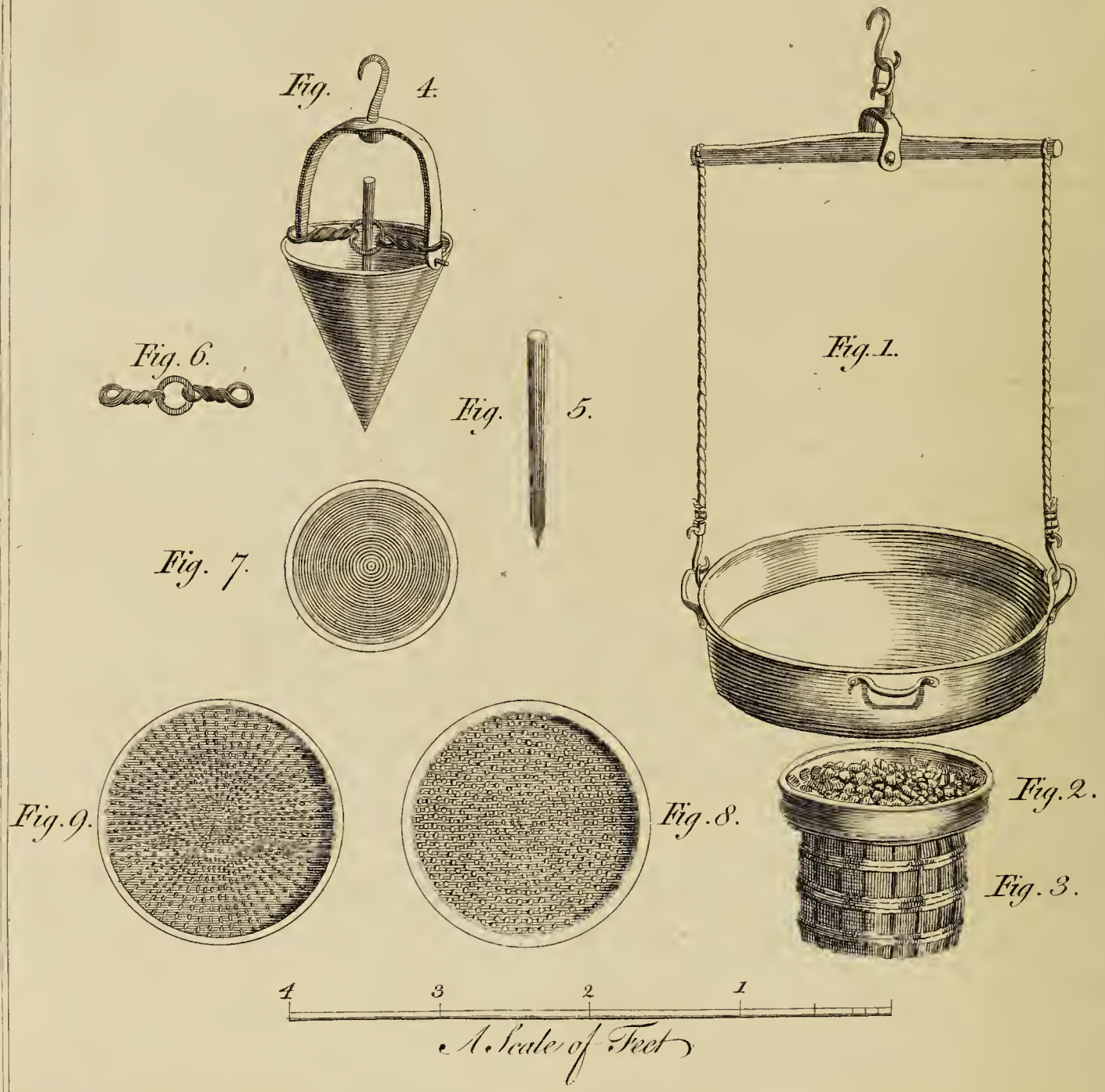
CONDITIONAL Propositions, are such as consist of two parts, connected together by a conditional particle.

Thus,











Thus, "If the soul be spiritual, it is immortal", is called a conditional proposition.

**CONDUCTOR**, a chirurgical instrument used to direct the knife in the operation of lithotomy.

There are also other instruments called by this name, which are used for directing the knife in laying open sinuses or fistulas.

**CONDUIT**, a canal or pipe, for conveying water or other fluid matter.

**CONDYLOMA**, among physicians, a tubercule, or callous eminence which arises in the folds of the anus, or rather a swelling and hardening of the wrinkles of that part.

**CONDYLUS**, in anatomy, a knot in any of the joints, formed by the epiphysis of a bone.

**CONDYLUS**, in botany, signifies the joint of a plant.

**CONE**, in geometry, a solid figure whose basis is a circle, and its top terminates in a point.

If we take an immoveable point A (*plate XXV. fig. 2.*) elevated above the plane of a circle BCDE, and suppose a straight line XZ drawn through the point, and extended both ways from it to an indefinite length, to be carried quite round the circle, all the while touching its circumference, and continuing still fixed to the immoveable point; the line by this motion will describe two conick surfaces, which are vertical, or opposite, having their common vertex at the immoveable point.

The solid contained within this conick surface, between the immoveable point A and the circumference of the circle BCDE, is a cone; the immoveable point A is the vertex; the circle BCDE is the base: and a straight line AF drawn from the vertex to the centre of the base, is the axis of the cone: all the strait lines drawn from the vertex to the circumference of the base, as AB, AC, AD, AE, &c. are sides of the cone.

If the axis be perpendicular to its base, it is called a right cone, such as is represented *fig. 3.* if the axis be inclined to the base, as it is called a scalenous or oblique cone, such a one as is drawn *fig. 4.* The figure is always understood to be a right cone, when the contrary is not expressed.

The formation of a right cone may also be conceived by the revolution of a right-angled triangle round one of its legs, as upon an axis: thus let there be a right-angled triangle BFA (*fig. 3.*) let one of its legs AF be fixed, and let the triangle revolve round it; there will then be described the cone ACB, whereof AF, the fixed leg of the triangle, will be the axis and the circle BECD, described by the other leg BF will be the base.

A cone, described as above, will be more or less acute, according as the acute angle BAF, adjoining to AF, the immoveable leg of the describing triangle is more or less acute. Thus the cone ABC (*fig. 5.*) is less acute than the cone BCD; because the angle BDF is less than the angle BAF.

Let ABCD (*fig. 6.*) be a cone formed by the revolution of the triangle ABC about the side AC remaining fixed as an axis; it is manifest that every line drawn parallel to BC will form a circle, of which that formed by BC will be the greatest, and that the sum of all these circles will be the whole cone. If another line mp, be drawn parallel to MP, and infinitely near it, pP will be the fluxion or increment of the two circles formed by the revolution of the two points m and M. If then the area of the circle MP be multiplied by the fluxion, and the fluent found, we shall have the area of the cone MAP, which will be to the whole cone ABD, as AP is to AC. Hence the solidity is easily found, and is always equal to that of one third of the circumscribing cylinder. See **CYLINDER**.

**CONE**, in botany, a dry, hard seed-vessel, of a roundish figure, tapering to a point, consisting of many woody parts, generally scaly, adhering closely together till ripe, when they separate.

**CONFECTION**, any thing prepared with sugar.

**CONFECTIONER**, a person whose business it is to make confections.

The manner of preparing solid, saccharine confections is as follows: The sugar, being first well clarified with pure

water and the white of an egg; is boiled to a consistence a little thicker than that of a sirup: then the thing which is to be preserved is put into a large copper vessel, flat bottomed, placed upon a gentle fire; and when it is moderately heated, together with its contents; the artist sprinkles some of the liquid sugar, before prepared, somewhat warm upon the things in the vessel, just enough to moisten them, and immediately stirs them to and fro, shakes them, and tosses the vessel in such a manner as to prevent the seeds, or whatever else it may be, from clustering together; then they are to be totally dried by a gentle coal-fire under the vessel. After this, as much dissolved sugar is to be added to the thing as is sufficient to moisten it moderately, and continuing the agitation, &c. it is to be dried. This operation is to be repeated, moistening and drying the materials by turns, till they are sufficiently covered with sugar. Confectioners, however, prepare things with greater ease, and in order to be able to sell them at a lower rate, they add starch to the dissolved sugar; by which means they not only dry them sooner, but also render them sufficiently large at a small expence.

To make confections red, infuse some red saunders in the water, or cochineal, or sirup of mulberries. If you would have them green, boil the juice of spinnage with the sugar; if yellow, put saffron in the water you mix with the sugar.

Confections are reduced to eight kinds, viz. 1. Dry confections. 2. Sugar-plumbs. 3. Liquid confections, those whose fruits, either whole, in pieces, in seeds, or in clusters, are connected in a fluid, transparent sirup; which takes its colour from that of the fruits boiled in it. 4. Marmalades. 5. Jellies. 6. Pastes. 7. Conserves. 8. Candies.

*Explanation of plate XXII. representing one part of the confectioner's art, that of making sugar-plumbs.*

The lower compartment of the plate represents the manner of making smooth and rough, or pearled sugar-plumbs.

*Fig. 1.* A workman making smooth sugar-plumbs. The composition of which the sugar-plumbs are made is put into a deep copper pan, suspended from the rims by two cords to a scale beam fastened to the ceiling. The workman taking hold of the handle, fixed for that purpose on one side of the copper vessel, moves the pan to and fro, shakes and tosses it over a chaffing-dish of burning charcoal, adding liquid sugar as he sees occasion, till the sugar-plumbs are of a proper size, and the composition thoroughly dry.

*Fig. 2.* A workman making pearled sugar-plumbs. The operation is here the same as before, except, instead of adding liquid sugar from a pan placed by him, it drops from a filtrating vessel suspended over the pan, by which means the surface of the sugar-plumbs are rendered rough.

*Fig. 3.* Is a workman finishing the sugar-plumbs, by rubbing them with his hands in a cullender, by which means they pass through the holes in the bottom into a cask, placed under the cullender for that purpose, and are either round or long, according to the form of the holes in the bottom of the cullender.

*Fig. 4.* Is a pan of sugar placed over a stove for melting it.

*The upper compartment.*

*Fig. 1.* The copper pan at large, with the manner how it is suspended.

*Fig. 2.* The chaffing-dish.

*Fig. 3.* A small cask supporting the chaffing-dish.

*Fig. 4.* The filtrating instrument. This vessel is made of tin, in a conical form, having a hole in the point, through which the sugar drops.

*Fig. 5.* A broach, which being thrust into the hole at the point of the filtrating vessel, closes it up either entirely or in part.

*Fig. 6.* The ring and twisted cord by which the broach is suspended.

*Fig. 7.* A view of the inside of the filtrating vessel, with the hole in its centre.

*Fig. 8.* The bottom of a cullender pierced with round holes.



*Fig. 9.* The bottom of a cullender pierced with long holes.

**CONFEDERACY**, an alliance or league between divers princes or states.

**CONFEDERACY**, is law, in when two or more persons combine together to commit any unlawful action.

**CONGE d'elire**, in ecclesiastical polity, the king's permission royal to a dean and chapter in the time of a vacancy, to choose a bishop; or to an abbey or priory, of his own foundation, to choose their abbot or prior.

**CONGE**, in architecture, a mould in form of a quarter round, or a cavetto, which serves to separate two members from one another, such as that which joins the shaft of the column to the cincture, called also apothyge.

**CONGES**, are also rings or ferrules formerly used in the extremities of wooden pillars, to keep them from splitting, afterwards imitated in stone-work.

**CONGELATION**, freezing, or such a change produced by cold in a fluid body, that it quits its former state, and becomes congealed.

**CONGER**, in zoology, the name of a species of muræna, with the upper edge of the back-fin black, called in English the sea-eel.

**CONGERIES**, a collection or aggregate of several particles, or bodies united into one mass.

**CONGESTION**, in medicine, a collection of humours, formed gradually; whereby it differs from de-fluxion, which is made on a sudden.

**CONGIUS**, a liquid measure of the ancient Romans, containing the eighth part of the amphora, or the fourth of the urna, or six sextarii. The congius, in the English measure contains 2,070,676 solid inches; that is, seven pints, 4,942 solid inches.

**CONGLBOATE Glands**. Modern anatomists have reduced all the glands of the body to two sorts, that is, the conglobate glands and the conglomerate glands.

A conglobate gland is a little smooth body wrapped up in a fine skin, by which it is separated from all other parts, only admitting an artery or nerve to pass in, and giving way to a vein and excretory canal to come out. Of this sort are the glands of the brain, and the testes. *Keill's Anatomy.*

Under the name of conglobate glands, Winslow includes the lymphatick glands alone; and he calls all the other glands of the body by the name of conglomerate.

**CONGLOMERATE Gland**, is composed of many little conglobate glands, all tied together, and wrapped up in one common tunicle or membrane. Sometimes all their excretory ducts unite and make one common pipe, through which the liquor of all of them runs, as the pancreas and the parotides do. Sometimes the ducts uniting form several pipes, which only communicate with one another by cross canals; and such are the mammæ: others again have several pipes, without any communication with one another; of which sort are the glandulæ lachrymales and prostatae: and a fourth sort is, when each little gland has its own excretory duct, through which it transmits its liquor to a common basin, as the kidneys. *Keill's Anatomy.*

**CONGRESS**, in political affairs, is an assembly of commissioners, deputies, envoys, &c. from several courts, meeting to concert matters for their common good.

**CONGRUITY**, in the schools, a suitability or relation of agreement between things. The system of congruity in matters of grace consists in this, that God who knows perfectly the nature of grace, and the dispositions of the will in all the circumstances that shall befall a man, gives graces with which, by virtue of their congruity with the will of man considered in those circumstances, man will always infallibly, but not necessarily, do what God would have him do.

**CONGRUITY**, in geometry, is applied to figures, lines, &c. which being laid upon each other, exactly agree in all their parts, as having the very same dimensions.

**CONGRUITY**, among naturalists, a property relative to a fluid body, whereby any part of it is readily united with any other part, either of itself, or of any other similar fluid, or solid body. And incongruity is a property by which it is hindered from uniting with the solid or fluid body dissimilar to it.

**CONICK-SECTIONS**, curves formed from the section of a cone by a plane.

The curves that generally pass under the name of conick sections are three, viz. the ellipsis, parabola, and hyperbola; for though the triangle and circle are formed from the section of a cone, yet they are not usually considered in that capacity.

If a right cone be cut directly through its axis, the plane or superficies of that section will be a plain isosceles triangle as HVG, (*plate XXIII. fig. 5.*) to wit, HV and VG, the sides of the cone will be the sides of the triangle, HG the diameter of the cone's base will be the base of the triangle, and its axis VC will be the perpendicular height of the triangle.

If a right cone be cut any where off by a right line parallel to its base, the plane of that section will be a circle, because the base of the cone is a circle.

If a right cone be any where cut by a right line that cuts both its sides, but not parallel to its base as TS (*fig. 6.*) the plane of that section will be an ellipsis, commonly called an oval; that is, an oblong or imperfect circle, having several diameters, and two particular centres. See **ELLIPSIS** and **DIAMETER**.

If any cone be cut into two parts by a right-line parallel to one of its sides, as SA (*fig. 7.*) the plane of that section, namely, SbBABb, is called a parabola.

If a cone be any where cut by a right-line either parallel to its axis, as SA (*fig. 8.*) or otherwise, as xN, in such a manner that the intersecting line when continued through one side of the cone, as at S or x, will meet with the other side of the cone if it be continued beyond the vertex V, as at T, then is the plane of that section, namely SbBABb called an hyperbola. See **HYPERBOLA**.

These five sections, namely, the triangle, circle, ellipsis, parabola, and hyperbola, are all the planes that can possibly be produced from a cone. But of them the three last, as we said above, are only called conick sections, both by ancient and modern geometers.

From the genesis of these sections, it may be observed how one section degenerates into another. For an ellipsis being that plane of any section of the cone which is between the circle and parabola, it will be easy to conceive that there may be great variety of ellipses produced from the same cone; and when the section comes to be exactly parallel to one side of the cone, then the ellipsis degenerates into a parabola. Now a parabola being that section whose plane is always exactly parallel to the side of the cone, cannot vary as the ellipsis may; for so soon as ever it begins to move out of that position of being parallel to the side of the cone, it degenerates either into an ellipsis or hyperbola. That is, if the section inclines towards the plane of the cone's base, it becomes an ellipsis; but if it incline towards the cone's vertex, it then becomes an hyperbola, which is the plane of any section that falls between the parabola and the triangle: and therefore there may be as many varieties of hyperbolas produced from one and the same cone, as there may be ellipses.

In short, a circle may change into an ellipsis; the ellipsis into a parabola, the parabola into an hyperbola, and the hyperbola into a plain isosceles triangle. And the centre of the circle, which is its focus, divides itself into two focus's, so soon as ever the circle begins to degenerate into an ellipsis; but when the ellipsis changes into a parabola, one end of it flies open, one of its foci vanishes, and the remaining focus goes along with the parabola when it degenerates into a hyperbola. And when the hyperbola degenerates into a plain isosceles triangle, this focus becomes the vertical point of the triangle, namely the vertex of the cone. So that the centre of the cone's base may be truly said to pass gradually through all the sections; untill it arrive at the vertex of the cone, still carrying its latus rectum along with it. For the diameter of a circle being that right-line which passes through its centre or focus, and by which all other right-lines drawn within the circle are regulated and valued, may be called the circle's latus rectum; and though it lose the name of diameter when

the



the circle degenerates into an ellipsis, yet it retains the name of latus rectum with its first properties in all the sections, gradually shortening as the focus carries it along from the section to another, until at last both it and one focus become coincident, and terminate in the vertex of the cone. For the nature and properties of the ellipsis, parabola, and hyperbola, see each under its proper head.

**CONIFEROUS TREES**, in botany, such as bear cones, as the cedar, fir, pine, &c.

**CONJUGATE DIAMETER**, of an ellipsis, is the shortest of the two diameters, or that bisecting the transverse diameter.

**CONJUGATE Hyperbolas**. If there be two opposite hyperbolas,  $AM$ ,  $am$  (plate XXVI. fig. 16.) whose principal axis is the line  $Aa$ , and conjugate axis the line  $Bb$ ; and if there be two other hyperbolas whose principal axis is the line  $Bb$ ; and conjugate one the line  $Aa$ , then these four hyperbolas are called conjugate hyperbolas, the two former opposite ones being conjugates to the latter.

**CONJUGATION**, in grammar, an orderly distribution of the several parts, or inflexions of verbs, in their different moods and tenses, to distinguish them from each other.

**CONJUNCTION**, in astronomy, is the meeting of the stars or planets in the same degree of the zodiac; and is either true or apparent.

The true conjunction is when a right line, drawn from the eye through the centre of one of the bodies, would pass through that of the other; in this case the bodies are in the same degree of longitude and latitude: and here the conjunction is also said to be central, if the same line, continued from the two centres through the eye, do also pass through the centre of the earth.

Apparent conjunction is when the two bodies do not meet precisely in the same point, but are joined with some latitude.

**CONJUNCTION**, in grammar, a particle which expresses a relation between words and phrases; so called, because it serves to join, or connect, the parts or members of a discourse.

Conjunctions signify the form of our thoughts, and not properly their objects; because these particles express nothing but the very operation of the mind, whereby we consider things absolutely or conditionally.

They render the discourse more smooth and fluent; and serve many good purposes, in the argumentative or narrative style; but must ever be omitted where a person speaks with emotion, as only serving to weaken and enervate it. Boileau observes, that nothing gives more warmth and life to discourse than to drop the copulatives; a passion, adds he, embarrassed with conjunctions and useless particles, loses all the fire and vehemence it would acquire in its progress.

**CONJUNCTIVA TUNICA**, in anatomy, the external coat or membrane of the eye. See EYE.

**CONNECTION**, or **CONNEXION**, the relation by which one thing adheres to or depends upon another.

**CONNECTION**, or *Continuity*, in the drama, consists in the joining of the several scenes together.

The connection is said to be observed, when the scenes of an act succeed one another immediately, and are so joined, as that the stage is never left empty.

**CONNIVENT VALVES**, in anatomy, those wrinkles, cellules, and vascules, which are found in the inside of the two great intestines, the ilium and jejunum.

The inner tunick of the guts, being longer than the middle or the outward tunick, does frequently wrinkle, or bag out, in many places, by which means the passage for the contents become straightened, and the matter through the guts then descends more slowly, so that the lacteals have the more time to imbibe the chyle.

**CONNOISSEUR**, a French word much used of late in English, to signify a person well versed in any thing: whence it is used for a critick, or a person who is a thorough judge of any subject.

**CONOCARPUS**, the **BUTTON-TREE**, in botany, a genus of the pentandria monogynia class. The corol-

la consists of four petals; the seeds are naked, solitary, and below the flower; and the flowers are aggregated.

There are three species, all natives of the Indies.

**CONOID**, in geometry, is a solid body generated by the revolution of a conick section about its axis.

**Elliptical CONOID**, is a solid formed by the revolution of an ellipsis about one of its diameters; and is more generally called spheroid. See the article SPHEROID.

**Parabolical CONOID**, is a solid formed by the revolution of a parabola about its axis.

**Hyperbolical CONOID**, is generated by the revolution of an hyperbola about its axis.

**CONOIDES Corpus**, in anatomy, the glandula pinealis, or pineal gland. See the article BRAIN.

**CONSANGUINITY**, the relation subsisting between persons of the same blood, or who are sprung from the same root.

**CONSCIENCE**, in ethicks, a secret testimony of the soul, whereby it approves of things naturally good, and condemns those that are evil.

**CONSCRIPT**, an epithet given by the ancient Romans to their senators, who were called conscript fathers.

**CONSECRATION**, the act of devoting any thing to God. But among the Romanists, it is more generally taken for the priests turning the elements into the body and blood of our Lord at mass.

**CONSECTARY**, among mathematicians, implies a deduction or consequence drawn from a preceding proposition.

**CONSENT**, in a general sense, denotes much the same with assent.

**CONSENT of Parts**, in the animal œconomy, an agreement or sympathy, whereby when one part is immediately affected, another at a distance becomes affected in the same manner.

It can hardly be imagined what a consent there is between the brain and its membranes, between the stomach and the adjoining intestines; these being very nervous, and endued with an exquisite sense; whence many students are troubled with a bad digestion, costiveness, and the hypochondriack passion.

The harmony and sympathy of the nervous parts is of great use in physick, for without an accurate knowledge of this, many symptoms of diseases are scarcely to be explained.

It is to be observed, that the nervous membranaceous parts are, first, the membranes of the brain, and spinal marrow; then the nervous membranes which invest the organs of the senses; to these may be added those which cover the bones, head, teeth, joints and muscles. Likewise the œsophagus, stomach, and the whole volume of the intestines, which is entirely nervous and membranaceous. The same consent obtains also in the whole system of the bilious and urinary ducts; the bladder, glands, and skin. In all these parts there is a wonderful connection, consent, sympathy and communion of motions, as well as hurts, when they are affected by any violent cause: all which is owing to the nerves; for when they are molested, there arises a sense of pain, and a stricture of the adjacent parts, especially of the vessels.

**CONSEQUENCE**, in logick, the conclusion, or what results from reason or argument.

**CONSEQUENT**, in logick, the last proposition of an argument or syllogism, being something gathered from the former premises.

**CONSEQUENT of a Ratio**, in mathematicks, is the latter of two terms of a ratio, or that to which the antecedent is composed. Thus in the ratio of  $a$  to  $b$ ,  $b$  is the consequent, and  $a$  the antecedent.

**CONSERVATORY**, among gardeners, the same as green-house. See the article GREEN-HOUSE.

**CONSERVE** in pharmacy, an electuary prepared of flowers, &c. bruised, and mixed up with sugar.

**CONSISTENCE**, in philosophy, that state of a body when its component particles are so connected, or entangled among themselves, as not to separate or recede from one another.

**CONSISTENCE**, when used relative to age or a disease,



case, imports the state or acme thereof: thus we distinguish three states or stages of a tree, its growth, consistence or age, beyond which it does not grow, and return. The consistence of oaks from fifty to one hundred and sixty years. Some, however, hold that their consistence only commences from one hundred years, asserting that they grow till that time, and that they continue in that state of perfection to two hundred years of age.

**CONSISTENT BODIES**, a term frequently used by Mr. Boyle, to signify such bodies whose parts are firmly united together, so that they do not so easily slide over one another's surfaces as the parts of fluid bodies do. That author has an essay of the atmosphere of consistent bodies, wherein he shews that all, even solid, hard, fixed bodies emit effluvia to a certain space all around them.

**CONSISTENTES**, in church history, an appellation given to such penitents as were permitted to assist at prayers, but not to partake of the sacrament.

**CONSISTORY**, a court at Rome, held with the greatest splendor and solemnity, in the great hall of St. Peter's palace, at the pope's pleasure; who is seated on a chair of gold, on a throne covered with scarlet. The cardinal-priest and bishops are placed on his right hand, and the cardinal-deacons on his left. The other prelates, prothonotaries, auditors of the rota, and other officers, sit upon the steps of the seat; the other ambassadors sit on the ground: kings ambassadors are seated on the pope's right: it is in this consistory that causes are pleaded before the pope.

**CONSOLATION**, a figure in rhetorick, whereby the orator endeavours to abate or moderate the grief of another.

**CONSOLE**, in architecture, an ornament cut upon the key of an arch, which has a projecture, and often serves to support small cornices, figures, busts or vases.

**CONSONANCE**, in musick, generally implies the same with concord, or the agreement of two sounds, produced at the same time, the one grave and the other acute. See the article **CONCORD**.

**CONSONANCE**, in grammar, implies a similar cadence of words and periods.

**CONSONANT**, a letter that cannot be sounded without some single or double vowel either before or after it.

**CONSONANT Strings**, in musick, are such as produce sounds either in unison or concord.

**CONSPIRACY**, in law, implies an agreement between two or more persons, in order to procure an indictment for felony against an innocent person.

**CONSTABLE**, originally was a great officer of the crown, and still subsists on particular occasions under the title of lord-high constable.

When this office was laid aside, it was ordered that two constables should be annually chosen for every hundred. These are what we now call high-constables, on account that the increase of people and offences has made it necessary to appoint others under these, in every town, called petty constables, who are of the like nature though of inferior authority to the other. The high-constable over the whole hundred is usually chosen and sworn into his office by the justices of the peace, in their sessions: and as to petty constables in towns, villages, &c. the right of choosing them belongs to the court-leet, though they may be elected by the parishioners. They are appointed yearly, and ought to be men of honesty, knowledge, and ability; and if they refuse to serve, or do not perform their duty, they may be bound over to the sessions, and there indicted or fined.

**CONSTAT**, in law, a certificate that the clerk of the pipe, and the officers of the exchequer, grant, at the request of any person, who intends to plead or move in that court, for the discharge of any thing.

**CONSTELLATION**, in astronomy, a system of several stars that are seen in the heavens, near to one another. Astronomers not only mark out the stars, but that they may better bring them into order, they distinguish them by their situation and position in respect to each other; and therefore they distribute them

into asterisms, or constellations, allowing several stars to make up one constellation: and for the better distinguishing and observing them, they reduce the constellations to the forms of animals, as men, bulls, bears, &c. or to the images of some things known, as of a crown, a harp, a balance, &c. or give them the names of those, whose memories, in consideration of some notable exploit, they had a mind to transmit to future ages. The venerable Bede, indeed, out of a vain zeal, instead of the names and figures of the twelve constellations, substituted those of the twelve apostles; Julius Schillerius, in 1627, completed the reformation, and gave scripture-names to all the constellations in the heavens. But as these innovations could serve no purpose, but that of introducing quarrels into astronomy, the old constellations are still retained, both because better could not be substituted, and likewise to keep up the greater correspondence and uniformity between the old astronomy and the new.

The division of the stars by images and figures is of great antiquity, and seems to be as old as astronomy itself; for in the most ancient book of Job, Orion, Arcturus, and the Pleiades are mentioned; and we meet with the names of many of the constellations in the writings of the first poets, Homer and Hesiod.

The ancients, in their division of the firmament, took in only so much as came under their notice, distributing it into forty-eight constellations; but the modern astronomers comprehend the whole starry firmament, dividing into three regions: 1. The zodiack, or that portion of the heavens in which the planets would appear to move, to an eye placed in the sun: the breadth of this space depends on the inclination of the orbits, in which the planets move, to one another; and includes twelve constellations, commonly called the signs of the zodiack, viz. Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius, and Pisces. 2. All that region of the heavens that lies on the north side of the zodiack, which contains twenty-one constellations, namely, the Ursa Minor and Major, Draco, Cepheus, Bootes, Corona Septentrionalis, Hercules, Lyra, Cygnus, Cassiopea, Perseus, Andromeda, Triangulum, Auriga, Pegasus, Equuleus, Delphinus, Sagitta, Aquila, Serpentarius, and Serpens; to which were added afterwards two others, viz. that of Antinous, which was made of the stars not included in any image, near the eagle; and Berenice's hair, consisting of stars which are near the lion's tail. 3. That region on the southern-side of the zodiack, which contains fifteen constellations, known to the ancients, viz. Cetus, the Eridanus, Lepus, Orion, Canis Major, Canis Minor, Argo, Hydra, Crater, Corvus, Centaurus, Lupus, Ara, Corona Meridionalis, and Piscis Australis: to these are lately added twelve more constellations, which are not to be seen by us, who inhabit the northern regions, because of the convexity of the earth, but in the southern parts they are very conspicuous; these are the Phoenix, Grus, Pavo, Indus, Avis Paradisi, Triangulum Australe, Musca, Chameleon, Piscis Volans, Toucan, Hydrus, Xiphias. The Galaxy, or Milky-way, is also to be reckoned among the constellations. See each constellation, and the number of stars it contains, under its proper head, **ARIES**, **TAURUS**, &c.

Without the compass of these constellations there are several stars which cannot be reduced to any of the forms mentioned, and these by the ancients are called Informes or Sporades; out of which some great astronomers have made new constellations, as Charles's-heart and Sobieski's-shield.

**CONSTIPATION**, in medicine, a hardness of the belly, with great costiveness.

**CONSTITUTION**, in civil polity, implies the form of government established in any country or kingdom.

**CONSTITUTION**, among physicians, signifies that particular disposition of the human body which renders it proper for exercising its functions conformable to nature.

**CONSTRICTION**, in anatomy, an appellation given



given to several mufcles of the human body, on account of their constringing or shutting up fome of the orifices of the human body.

**CONSTRUCTION**, in geometry, is the drawing fuch lines, fuch a figure, &c. as are previously neceffary for the making any demonftration appear more plain and undeniable.

**CONSTRUCTION of Equations**, in algebra, the method of drawing a geometrical figure, whose properties fhall exprefs the given equation, in order to demonftrate the truth of it geometrically.

Conffruction of fimple equations is performed by refolving the fractions, to which the unknown quantity is equal, into proportional parts. Thus if  $\frac{da}{b} = x$ , then

it will be as  $b:d::a:x$ . Whence  $x$  will be determined by the method of finding a fourth proportional. Sup-

pofe the equation to be  $\frac{ab+mn}{r-s} = x$ , firft find a mean proportional between  $a$  and  $b$ , which fuppoſe to be  $p$ , alfo another mean proportional between  $m$  and  $n$ , which fuppoſe to be  $q$ , then the equation will ftand thus  $\frac{pp+qq}{r-s} = x$ . Which may be conffructed in the follow-

ing manner: let the bafe of a right-angled triangle be made equal to  $q$ , and the perpendicular equal to  $p$ ; then will the fquare of the hypothenuſe be equal  $pp+qq$ , which according to the equation is to be divided by  $r-s$ . Therefore it will be as  $r-s$ : the hypothenuſe ( $=\sqrt{pp+qq}$ ): the hypothenuſe to a third proportional, which will give  $x$  required.

**CONSTRUCTION of quadratick Equations**. In order to render the conffruction of quadratick equations more eafy to be underffood, it is neceffary to fhew the nature of curves of the fecond order, which are made uſe of in conffructing equations of this kind. See **CURVE**.

The general equation expreffing the nature of the lines of the fecond order, having all its terms and coefficients, will be in this form:

$$\left. \begin{array}{l} y^2 + axy + cx^2 \\ + by + dx \\ + e \end{array} \right\} = 0$$

where  $a, b, c, d, e$ , reprefent any given quantities with their proper figns prefixed to them.

If a quadratick equation is given, as  $y^2 + py + q = 0$ , and by comparing it with the preceding, if you take the quantities  $a, b, c, d, e$ , and  $x$  fuch, that  $ax + b = p$ , and  $cx^2 + dx + e = q$ , then will the values of  $y$  in the firft equation be equal to the values of it in the fecond; and if the locus of it be defcribed according to the firft equation, the two values of the ordinate, when  $ax + b = p$  and  $cx^2 + dx + e = q$ , will be the two roots of the equation  $y^2 + py + q = 0$ . See the article **LOCUS**.

And as four of the given quantities  $a, b, c, d, e$ , may be taken at pleaſure, and the fifth with the abſcis  $x$  determined fo, that  $ax + b$  may be ftill equal to  $p$ , and  $cx^2 + dx + e = q$ ; hence there are innumerable ways of conffructing the ſame equation. But theſe loci are to be preferred which are defcribed moſt eafily; and therefore the circle of all conick fections is to be preferred for the refolution of quadratick equations.

**CONSTRUCTION of cubick and biquadratick Equations**.

The roots of any equation may be determined by the interfections of a ſtraight line with a curve of the ſame dimensions as the equation, or by the interfections of any two curves, whoſe indices multiplied by each other gave a product equal to the index of the propoſed equation.

Thus the roots of a biquadratick equation may be determined by the interfections of two conick fections; for the equation, by which the ordinates from the four points in which theſe conick fections may cut one another can be determined, will ariſe to four dimensions: and the conick fections may be affumed in ſuch a manner, as to make this equation coincide with any propoſed biquadratick: fo that the ordinates from theſe four interfections will be equal to the roots of the propoſed biquadratick.

If one of the interfections of the conick fection fall upon the axis, then one of the ordinates vaniſhes; and the equation by which theſe ordinates are determined will then be of three dimensions only, or a cubick, to

which any propoſed cubick equation may be accommodated; fo that the three remaining ordinates will be the three roots of that propoſed cubick.

Thoſe conick fections ought to be preferred for this purpoſe that are moſt eafily defcribed. They muſt not, however, be both circles; for their interfections are only two, and can ſerve only for the refolution of quadratick equations.

Yet the circle ought to be one, as being moſt eafily defcribed; and the parabola is commonly affumed for the other.

**CONSTRUCTION**, in grammar, is the ranging and connecting the words of a ſentence according to the rules of a language.

**CONSUBSTANTIAL**, among divines, a term denoting ſomething of the ſame ſubſtance with another. Thus the orthodox believe the Son of God to be conſubſtantial with the Father. The word *ὁμοουσιος*, conſubſtantial, was firſt adopted by the fathers of the council of Antioch and Nice, to expreſs the orthodox doctrine more precisely, and to ſerve as a barrier and precaution againſt the errors and ſubtilties of the Arians, who owned every thing except the conſubſtantiality.

**CONSUBSTANTIATION**, a term uſed by thoſe of the Lutheran perſuaſion, to expreſs their belief of our Saviour being preſent in the elements along with the bread and wine in the eucharift.

**CONSUL**, among the ancient Romans, was the chief magiſtrate of the republick.

**CONSUL**, at preſent, implies an officer eſtabliſhed in moſt foreign ports of conſequence, by virtue of a commiſſion from the government, to facilitate and diſpatch commercial affairs, and protect the merchants of his nation.

**CONSUMPTION**, in medicine. a word of very extenſive ſignification, implies all diſorders that bring any decay or waſte upon the conſtitution.

Physicians divide it into ſeveral kinds, according to the variety of its cauſes, as univerſal or ſcorbutick conſumption, where it ariſes from a cacoehymia or ſcorbutick habit; and pulmonick conſumption, where it ariſes from ſome cauſe in the lungs, properly called a phthiſis.

A conſumption may either be hereditary, natural, or accidental. In the firſt caſe, the taint is originally fixed in the conſtitution of the embryo, and interwoven with its firſt principles of life. A natural conſumption may proceed from the ſtraitneſs of the thorax, or a particular ill formation in ſome of the principal viſcera; and the laſt ſpecies, called alſo ſymptomatick conſumptions, derive their origin, or in ſome ſort depend upon various diſtempers; as, 1. A conſumption ariſing from a gonorrhœa, or a fluor albus, if it be confirmed, and hath been of a long ſtanding, is very difficult to cure: if it be recent, the running is to be ſtopped with great caution; and the heſtickal heats, if any, are to be allayed by means of a milk diet, or the chalybeate mineral waters. 2. A conſumption from abſceſſes and ulcers, in which caſe the ulcer muſt be ſeaſonably healed with the uſe of internals as well as externals; internal baſamicks muſt be preſcribed, and the greateſt care taken after the cure of the ulcer, leſt a pulmonary conſumption ſhould follow, wherefore iſſues are to be made, and the uſe of baſamicks continued, with a milk diet and mineral waters. 3. A conſumption from giving fuck. The infant is to be weaned in time, and the nurſe is to uſe a diet that yields good nourishment; and if a heſtick diſpoſition requires it, a milk diet and chalybeate waters. 4. A ſcrophulous conſumption, which is known by the glandulous tumours in the outward parts of the body, and from the frequent returns of ſore eyes and the itch. For the cure, unleſs there is an obſtruction of the liver attended with a dropſy, chalybeate waters muſt be drank a conſiderable time in ſummer. In winter, gums and baſamicks muſt be taken; and in the ſpring, a diet-drink with millepedes and antiſcrophulous and pectoral ingredients. Opiates ſhould not be given but in caſes of neceſſity. 5. A ſcorbutick conſumption, the principal diagnoſticks of which are, an eruption of ſpots diſpoſed here and there throughout the whole ſkin, almoſt a continual diſcharge of a viſcid ſaline pus from the



the jugular glands, especially in the morning; and an exulceration and extenuation of the jaws. The cure of this disease differs from the general method in the following particulars: opiates are always noxious; the pectoral medicines should be such as incise and cleanse; they should likewise be blended with antiscorbuticks, as water-creffes, &c. and steel is also useful, unless the disease is too far advanced. 6. An asthmatick consumption, for which there is nothing better than a fine, thin, wholesome air; and when this disease proceeds from a convulsive asthma, harts-horn drops will be of service. A consumption proceeding from the green-sickness and a suppression of the menses, with many others, have nothing peculiar in the manner of their cure, but what regards the primary diseases.

**CONTACT**, touching, or the point or points where one body touches another.

**CONTAGION**, among physicians, implies the communicating a disease from one body to another, either by contact or morbid effluvia.

**CONTEMPLATION**, an act of the mind, whereby it applies itself to consider very attentively the works of nature, the attributes of the Deity, &c.

**CONTEMPORARY**, a person or thing that existed at the same time with another. Thus Newton, Halley, and Coates, were contemporaries.

**CONTENT**, in geometry, the quantity of matter or space included within certain bounds.

**CONTEXT**, among critics, implies that part of the scriptures, or other writing, that precedes and follows the text.

**CONTIGNATION**, among the ancient architects, implied the art of laying rafters together.

**CONTIGUOUS Angles**, in geometry, are such as have one leg common to both.

**CONTINENT**, in geography, a vast continued space of land, containing many countries and kingdoms, and consequently not easily discernible to be surrounded by the sea.

**CONTINGENT**, something casual or uncertain, that may or may not happen.

**CONTINGENT Line**, in dialling, a line drawn at right-angles to the substyle, and represents the intersection of the plane of the dial with the plane of the equinoctial, and is consequently the place where the meridians and hour-lines intersect each other.

**CONTINUED QUANTITY**, or a *Continuum*, is that whose parts are inseparably joined and united together, so that you cannot distinguish where one begins and another ends.

**CONTINUED Proportion**, in arithmetick, is that wherein the consequent of the first ratio is the same with the antecedent of the seconds, as 4:8::8:16.

And, on the contrary, if the consequent of the first ratio be different from the antecedent of the second, the proportion is said to be discrete, as 3:6::4:8.

**CONTINUED Base**, in musick, is that which continues to play constantly, both during the recitatives, and to sustain the choir or chorus, the same as thorough base.

**CONTINUITY** is, as the schoolmen usually define, the immediate cohesion of parts in the same quantum; but others define it a mode of body, whereby the two extremes become one; others define it a state of body resulting from the mutual implication of its parts. And it is of two kinds.

**Mathematical CONTINUITY**, which is merely imaginary and fictitious, because it supposes real or physical parts where there are none.

**Physical CONTINUITY**: this is strictly that state of two or more parts or particles, whereby they appear to adhere or constitute one uninterrupted quantity or continuum; or between which no intermediate space is perceived. The schoolmen again distinguish it into two other kinds of continuity: As,

**Hemogeneous CONTINUITY**, is that where the bounds or extremes of the parts are not perceived by our senses, and this agrees even to air, water, &c.

**Heterogeneous CONTINUITY**, is where the extremes of certain parts are indeed perceived by the senses, yet, at the same time, the parts are observed to be closely

linked to each other, either in virtue of their situation, figure, &c. and this is chiefly attributed to the bodies of animals and vegetables.

**CONTOUR**, in painting, the out-line, terminating or defining a figure.

**CONTOUR**, in architecture, implies the outline of any member.

**CONTOURNE**, in heraldry, signifies a beast standing or running, with his face towards the sinister side of the escutcheon.

**CONTRABAND**, in commerce, implies such goods or merchandize, as are imported or exported, contrary to a direct ordinance of the state.

**CONTRACT**, a mutual agreement or covenant, between two or more parties.

**CONTRACTILE Force**, that property or power, inherent in certain bodies, whereby they are enabled, when extended, to draw themselves up again to their former dimensions.

**CONTRACTION**, in grammar and poetry, the reducing of two syllables into one, as lov'd for loved.

**CONTRACTION**, in logick, a species of reduction or abridgement, whereby propositions or arguments are shortened or reduced to less compass.

**CONTRACTION**, in philosophy, implies the diminishing the extent or dimensions of a body.

**CONTRACTION**, in anatomy, signifies the shrinking of a fibre when extended.

**CONTRADICTION**, a species of direct opposition, wherein one part of a proposition is directly opposite to the other.

**CONTRA-FISSURE**, in surgery, a fissure in the cranium, in a part opposite to, or at a distance from the part that received the injury.

**CONTRA-HARMONICAL PROPORTION**, in arithmetick, is that relation of three terms, wherein the difference of the first and second is to the difference of the second and third, as the third is to the first; thus, 3, 5, and 6, are numbers contra-harmonically proportional, for 2:1::6:3.

**CONTRA-INDICATION**, in medicine, an indication, which forbids that to be done, which the main scope of a disease points out: as if, in the cure of a disease, a vomit was judged proper; if the patient be subject to a vomiting of blood, it is a sufficient contra-indication as to its exhibition.

**CONTRAMURE**, in fortification, is a wall built between another partition-wall to strengthen it, so that it may receive no damage from the adjacent buildings.

**CONTRARIES**, in logick, are positive opposites, which being of the same kind, or some common nature, and subsisting by turns in the same subject, are as remote from each other as possible, and mutually expel each other.

**CONTRARY**, in rhetoric. F. de Colonia lays down three kinds of contraries in oratory, viz. adversatives, privatives, and contradictories. Adversatives are those that differ much in the same thing, as virtue and vice, war and peace, as in this of Cicero, *Si stultitiam fugimus sapientiam sequamur; & bonitatem, si malitiam*; and in this of Quintilian, *Malorum causa bellum est, erit emendatio pax*.

Drances, in Virgil, argues thus, *Nulla salus bello; pacem te possumus omnes*. Privatives are habits, and their privations. Contradictories are those, one whereof affirms and the other denies the same thing of the same subject. *Trevaux*.

**CONTRAST**, in painting and sculpture, expresses an opposition or difference of position, attitude, &c. of two or more figures, contrived to make variety in a painting, &c. as where, in a group of three figures, one is shewn before, another behind, and another sideways, they are said to be in contrast.

The contrast is not only to be observed in the position of several figures, but also in that of the several members of the same figure: thus, if the right arm advance furthest, the right leg is to be hindermost; if the eye be directed one way, the arm to go the contrary way, &c. the contrast must be pursued even in the drapery.

**CONTRAST**, in architecture, is to avoid the repetition of the same thing, in order to please by variety.

CON-



**CONTRAVALLATION**, or *the Line of Contravallation*, in fortification, a trench guarded with a parapet, and usually cut round about a place by the besiegers, to secure themselves on that side, and to stop the sallies of the garrison.

It is without musket-shot of the town, so that the army forming a siege, lies between the lines of circumvallation and contravallation.

**CONTRAYERVA**, the root of a plant growing in Peru and other parts of the Spanish W. Indies. The root is an inch or two in length, and about half an inch thick; full of knots and irregular tubercles; surrounded on all sides with numerous long tough fibres, most of which are loaded with scaly knobs; of a reddish brown colour on the outside, and pale within. It was first brought into Europe, about the year 1581, by Sir Francis Drake.

The contrayerva root is an excellent sudorifick; it strengthens the stomach, dispels flatulencies, and helps digestion. It is greatly used in fevers of many kinds, and is even by some recommended against the plague, as one of the greatest known remedies. It has the credit among many, of being the greatest antidote in the world against poisons of all kinds, and thence it obtained its name. It is given in powder and decoction, but with us principally in form of the lapis contrayerva; composed of crabs claws prepared one pound, prepared pearls and red coral of each three ounces, powder of contrayerva five ounces. This used to be wetted into a paste, and made up into balls, whence its name lapis contrayerva; but the new dispensatory orders it to be kept in powder, under the name of pulvis contrayerva compositus. Its dose is from ten grains to half a drachm.

**CONTRIBUTION**, in a general sense, the payment of each person's quota, or the share he bears in some imposition or common expence. Contributions are either voluntary, as those of expences for carrying on some undertaking for the publick interest; or involuntary, as those of taxes and imposts.

**CONTRIBUTION**, in a military sense, an imposition or tax paid by frontier-countries to an enemy, to prevent their being plundered and ruined by him.

**CONTRIBUTIO FACCENDA**, in law, a writ that lies where tenants in common are bound to do the same thing, and one or more of them refuse to contribute their part; as where they jointly hold a mill, pro indiviso, and equally share the profits thereof, if the mill falls to decay, and one or more of the persons refuse to contribute to its reparation, the rest shall have this writ to compel them.

**CONTRITION**, in theology, a sorrow for our sins, resulting from the reflection of having offended God, from the sole consideration of his goodness, without any regard to the punishment due to the trespass, and attended with a sincere resolution of reforming them.

The scripture never uses this term in this sense; but there are several passages which prove, that, without contrition, there is no repentance, and without repentance no remission of sins.

**CONTROL**, **COMPTROL**, or **CONTROLE**, is properly a double register kept of acts, issues of the officers or commissioners in the revenues, army, &c. in order to perceive the true state thereof, and to certify the truth, and the due keeping of the acts subject to the enregistrement.

**CONTROLLER**, or **COMPTROLLER**, an officer appointed to control or oversee the accounts of other officers, and, on occasions, to certify whether or no things have been controlled or examined.

**CONTROLLER of the Navy**, one of the principal officers of the navy-board, at which he presides to superintend and control the inferior and civil department of the marine, as the admiralty directs the superior and military operations of it.

**CONTROVER**, in law, a person who, of his own head, invents and spreads false news.

**CONTUMACY**, in law, a refusal to appear in court, when legally summoned; or the disobedience to the rules and orders of a court having power to punish such offence.

**CONTUSION**, in medicine, a bruise, or a solution of continuity, produced in any part of the body by any instrument whose surface does not rise by way of edge, but in any obtuse figure; by this means a contusion is distinguished from a wound, which is a solution of continuity produced by a sharp cutting instrument.

In the cure of a contusion, we must attempt a resolution, and if possible, prevent a suppuration, but much more a gangrene. Resolution is principally performed, first, by rendering the extravasated humours fluid; secondly, by relaxing the adjacent vessels; and, thirdly, by procuring the resorption of the extravasated humours into the vessels, by evacuating these vessels, or by friction.

Bleed therefore plentifully; soon after exhibit a strong, but not inflammatory purge; let a penetrating and resolvent fomentation be applied to the part, and let warm frictions be used: mean time internal resolvents, sudorificks, and diureticks, are of considerable service.

**CONVALLARIA**, in botany, a genus of the hexandria-monogynia class of plants, comprehending the convall-lilly, or lilly of the valley, *lilium convallium*, *solomon's seal*, *polygonatum*, the *unifolium*, and a species of *smilax*. In the lilly of the valley, the flower-petal, which is single in all of them, is globose, campanulated, and patent: in *solomon's seal*, it is tubulato-campanulated, and pointed: in the *unifolium*, the third part of the fructification is wanting: and in the *smilax* the flower-petal is divided into six very acute and patent segments: in all of them the fruit is a trilocular globose berry, containing single and roundish seeds.

**CONVENTICLE**, a private assembly or meeting for the exercise of religion.

**CONVENTION**, a treaty, contract or agreement, between two or more parties.

**CONVERGING LINES**, in geometry, are those that approximate nearer and nearer to each other.

**CONVERGING Series**. See the article **SERIES**.

**CONVERSE**, in mathematicks, is applied to a proposition when the same conclusion drawn from it will result when the terms are reversed.

**CONVERSION**, in a religious sense, is the turning or total change of a sinner from sin unto God. Psalm li. 13. God, and not man, is the author of this change, who by his spirit puts repentance, faith, love and every grace into the soul. Jer. xxxi. 18.

**CONVERSION**, in war, a military motion whereby the front of a battalion is turned where the flank was, in case the battalion is attacked in the flank.

**CONVEX**, an appellation given to the exterior surface of gibbous or globular bodies, in opposition to the hollow inner surface of such bodies, which is called concave: thus we say, a convex frieze, lens, mirror, superficies, &c.

**CONVEXITY**, that configuration or shape of a body, on account of which it is denominated convex.

**CONVEYANCE**, in law, a deed or instrument that passes land, &c. from one person to another.

**CONVICT**, in common law, a person that is found guilty of an offence by the verdict of a jury.

**CONVICTION**, in theology, expresses the first degree of repentance, wherein the sinner becomes sensible of his guilt, of the evil nature of sin; and of the danger of his own ways.

**CONVOCATION**, an assembly of the clergy of England, by their representatives, to consult of ecclesiastical matters.

The convocation consists of two houses, an upper and a lower: the former consists of bishops, and the latter of the inferior clergy, who are represented by their proctors, consisting of all the deacons and archdeacons, of one proctor for every chapter, and two for the clergy of every diocese; in all one hundred and forty-three divines.

The convocation is summoned by the king's writ, directed to the archbishop of each province, requiring him to summon all bishops, deans, archdeacons, &c. and the meeting is held during the session of parliament.

**CONVOLVULUS**, or **BIND-WEED**, in botany, a genus of the pentandria monogynia class. The corolla is bell-shaped, and plaited; it has two stigmata; and the capsule is bilocular, each cell containing two seeds.

There



There are forty-three species, only three of which are natives of Britain, viz. the arvensis, or small bind-weed; the sepium, or great bind-weed; and the soldanella, or sea bind-weed.

CONVOY, in the marine, any fleet or navy of merchant ships bound on a voyage to some particular port or rendezvous; or more particularly the ship or ships appointed to conduct and defend them on their passage thither.

CONVOY, in military affairs, a detachment of troops employed to guard any supply of men, money, ammunition, provisions, &c. conveyed in time of war by land to a town, or the like.

CONVULSION, *spasmus*, in medicine, a preternatural and violent contraction of the membranous and muscular parts, arising from a spasmodick stricture of the membranes surrounding the spinal marrow, and the nerves distributed from it, and an impetuous influx of the nervous fluid into the organs of motion.

Convulsions attack the patient variously; for in some they happen suddenly, without any signs of the approaching disorder; whilst in others, they may be foreseen by various signs. During the convulsive paroxysm, the limbs are surprisngly agitated; sometimes the arms are so retorted towards the back, that the patient seems to sit upon them; sometimes they beat the air: at other times, the legs are drawn into various directions; sometimes they stamp; sometimes the spine of the back is incurvated so as to form an arch, whilst the breast is raised; and at other times the whole body is as stiff as a stone. These agitations seize many in the very posture in which they are, without throwing them on the ground; whilst others, like epileptick patients, fall suddenly down, weep, laugh, grind their teeth, gape, hang out their tongue, and are vertiginous.

After the paroxysm many patients retain an incredible languor of the whole body, many fall into deliriums, and a profound sleep; in others, the disorder is terminated by eructations, an explosion of flatulencies, vomiting, a copious discharge of the lymph, &c. Those are most subject to convulsions, whose nervous systems are either naturally, or by any other cause, weak, especially if their juices be impure. Among the mediate causes which dispose to this constriction of the spinal marrow, the most considerable are violent passions, especially if the patient be exposed to cold, or commits any error in regimen.

Though convulsions are very terrible, they are not suddenly mortal: when they are recent, the patient young, and the constitution sound, an easy and short cure is to be hoped for.

In the cure of convulsive motions, we are first to correct the material causes which support the disorder; prepare them for an elimination, and commodiously evacuate them: then the violent and irregular commotions of the nervous parts must be allayed, and the nervous system corroborated, to prevent a relapse: the cure is not to be obtained by a great variety of drastick remedies; but rather by mild medicines, and such as are friendly to nature. If the disorder arises from a redundancy of humours, or a thickness of the blood, Hippocrates advises venæsection, either in the foot or arm, to be used; or scarifications to be interposed: but these motions are rarely removed without a proper air, exercise, and regimen. Warm baths for the feet, prepared of river-water and chamomile flowers, have a singular efficacy; and also large draughts of cold simple water. If convulsions arise from excess of venery, the patient is by all means to abstain from any thing that produces commotions. If they arise from a suppression of the menses, &c. they must be removed by recalling these evacuations.

CONVULSIVE, an involuntary contraction of the muscles.

COOLERS, in medicine, are those medicines which either affect the organs of feeling with an intermediate sense of coldness, or by a particular viscosity or grossness of parts, give the animal fluids a greater consistency, and consequently retard their motion. Cucumbers, melons, &c. are of this kind.

COOMB, or COMB of *Corn*, a dry measure containing four bushels, or half a quarter.

COPAL, in the materia medica, is a true resin, being inflammable and soluble in oil, though it, as well as the anime, and some other bodies of this class, is misnamed a gum.

The true copal is a resin of a considerably firm texture, brought to us from South America in large masses, or in single lumps or drops. The copal greatly resembles amber in appearance; it is of a fragrant smell; its taste is subastringent and somewhat aromack. The Americans use copal as they do anime, for disorders of the head, by way of fumigations. We do not use it at all in medicine, but an excellent varnish is made of it.

COPARCENERS, such as have portions of the estates of their ancestor.

COPERNICAN-SYSTEM, or HYPOTHESIS, that system of the world wherein the sun is supposed at rest in the centre, and the planets, with the earth, to move in ellipses round him.

The sun and stars are here supposed at rest, and that diurnal motion which they appear to have from east to west, is imputed to the earth's motion from west to east, round its axis.

This system was received of old by Philolaus, Aristarchus, and Pythagoras, from which last it had the name of the Pythagorick system: it was also held by Arthimedes; but after him it became neglected, and even forgotten for many ages, till it was revived by Copernicus, about the year 1500, and from him named the Copernican system.

According to this hypothesis, the sun is supposed very near the centre of gravity of the whole system, and in the common focus of every one of the planetary orbits: next him Mercury performs his revolution around him; next Mercury is the orbit of Venus; and next to Venus, our earth, with its attendant or secondary, the moon, performing a joint course, and in their revolution measuring out the annual period. Next the earth is Mars, the first of the superior planets; next him Jupiter, and last of all Saturn. See *plate XXIII. fig. 1.*

These and the comets are the constituent parts of the solar system, which is now received and approved as the only true one, for the reasons following. See the articles COMET, VENUS, MARS, &c.

1. It is most simple, and agreeable to the tenor of nature in all her actions; for by the two motions of the earth, all the phenomena of the heavens are resolved, which, by other hypotheses, are inexplicable, without a great number of other motions contrary to philosophical reasonings.

2. It is more rational to suppose that the earth moves round the sun, than that the huge bodies of the planets, the stupendous body of the sun, and the immense firmament of stars, should all move round the inconsiderable body of the earth, every twenty-four hours.

3. But that harmony which upon this supposition runs through the whole solar system, wonderfully confirms this hypothesis, viz. that the motions of all the planets, both primary and secondary, are governed and regulated by one and the same law, which is, that the squares of the periodical times of the primary planets, are to each other as the cubes of their distances from the sun; and likewise the squares of the periodical times of the secondaries of any primary, are to each other as the cubes of their distances from that primary. Now the moon, which, in the Copernican system is a secondary of the earth, in the other hypothesis is a primary one: and so the rule cannot take place, because the periodical time, considered as that of a primary one, does not agree therewith.

4. Again, this single consideration Mr. Whiston thinks enough to establish the motion of the earth for ever, viz. If the earth does not move round the sun, the sun must move with the moon round the earth. Now the distance of the sun, to that of the moon, being as 10,000 to 46, and the moon's period being less than 28 days, the sun's period would be found no less than 242 years; whereas, in fact, it is but one year.

5. The sun is the fountain of light and heat, which it irradiates







Fig. 1.

Copernican System

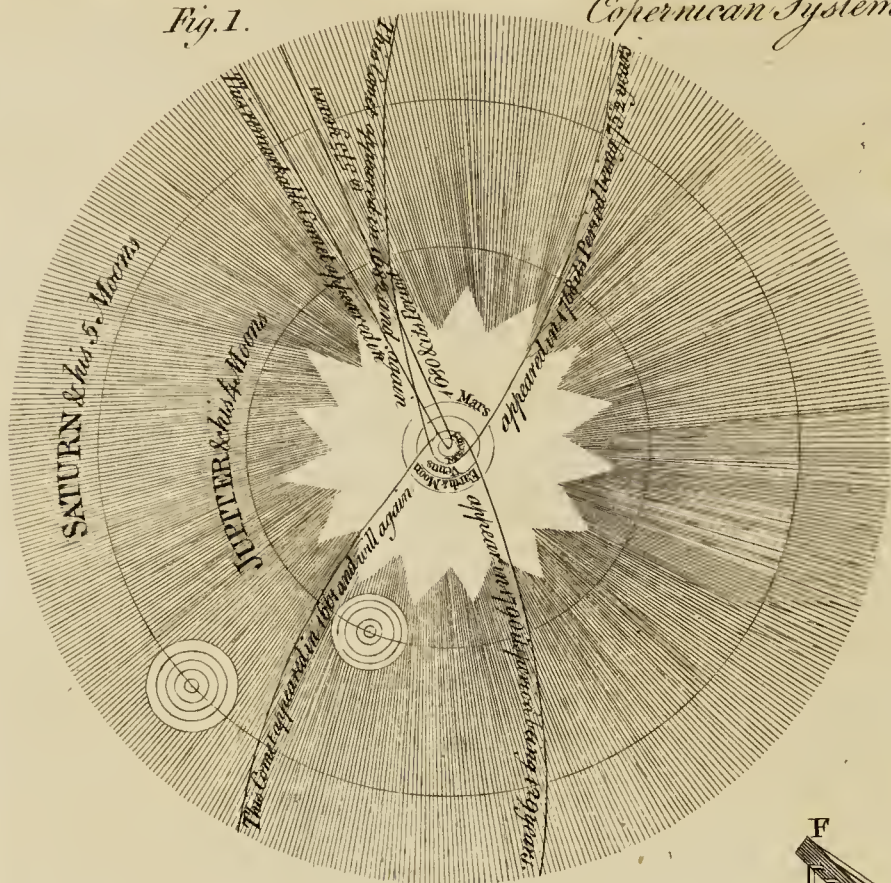
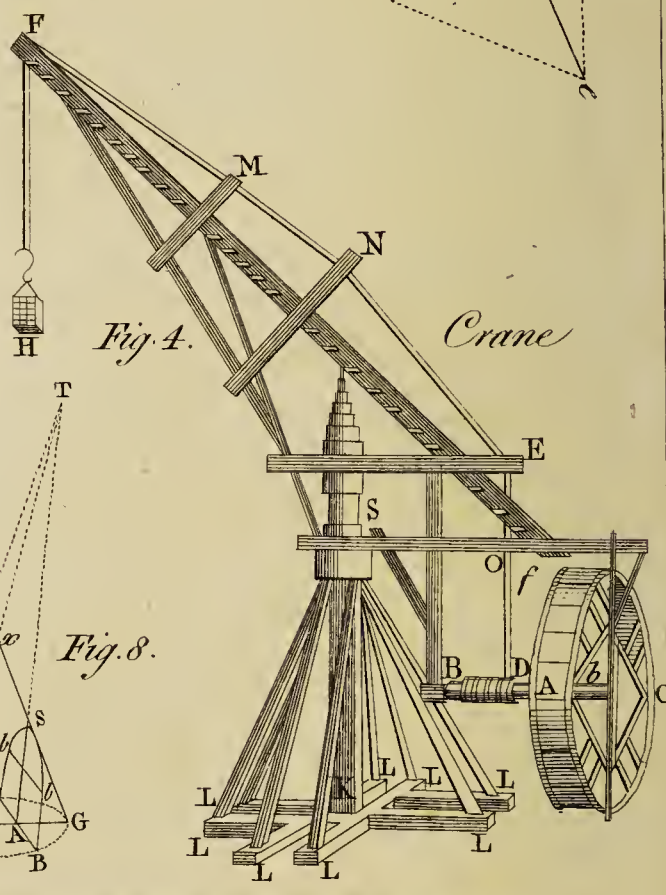
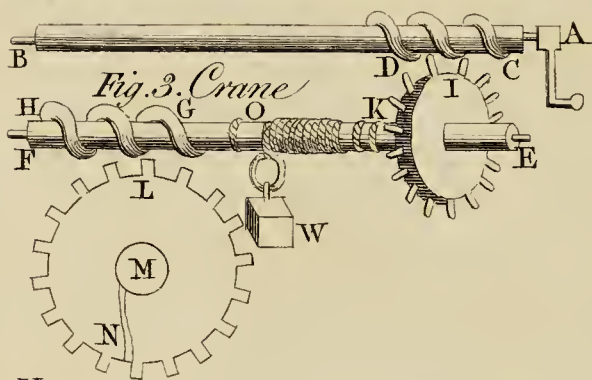
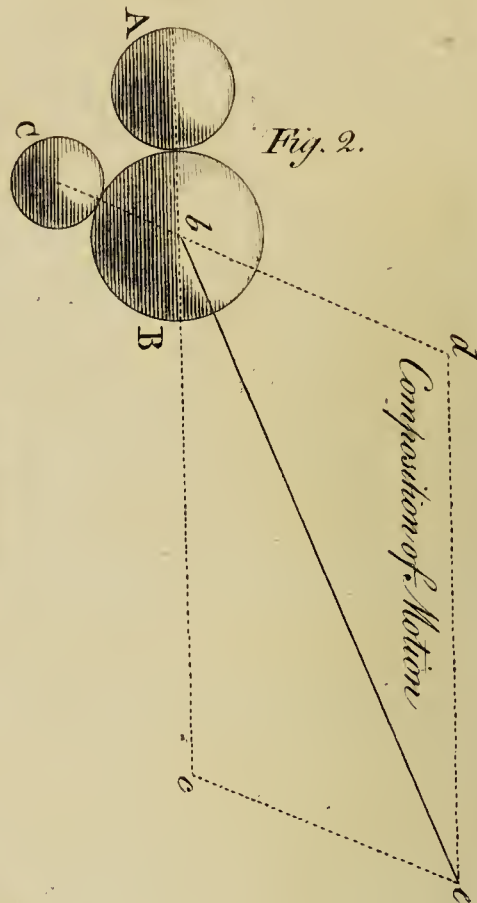
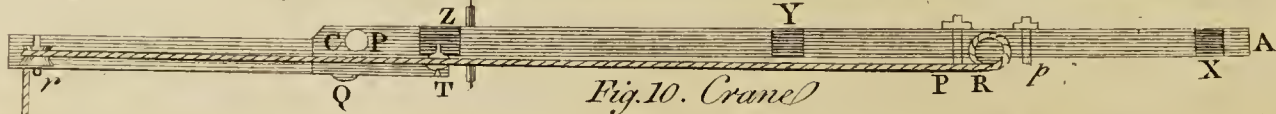
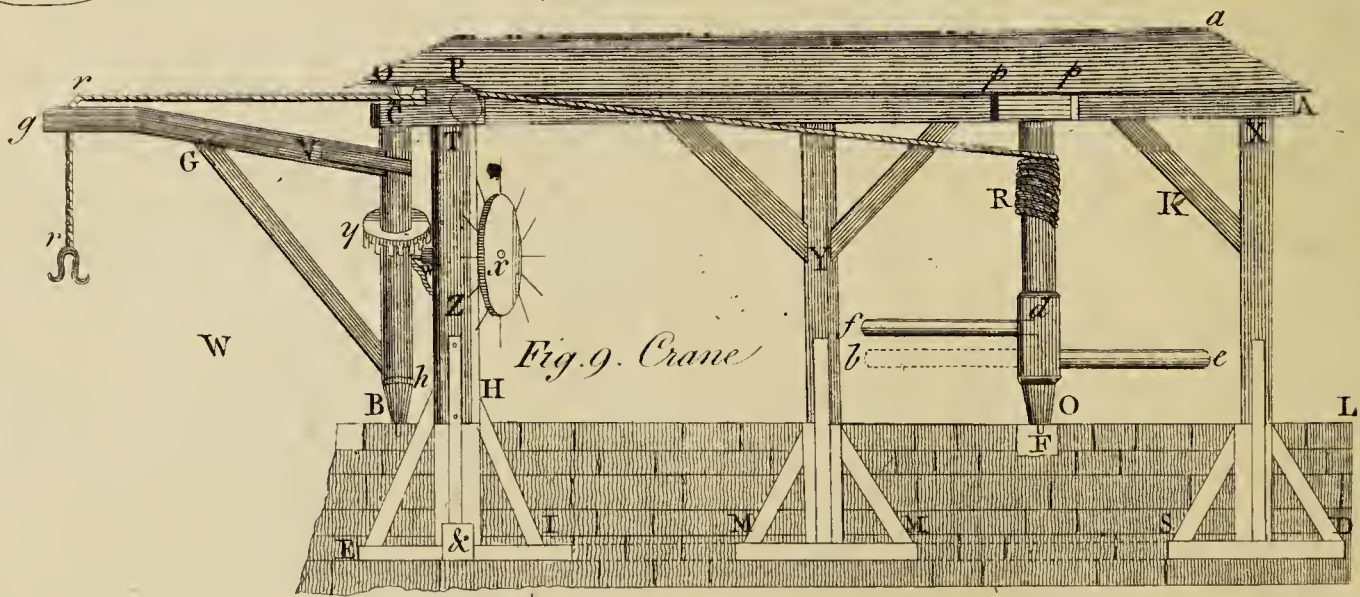
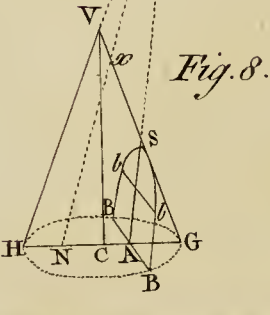
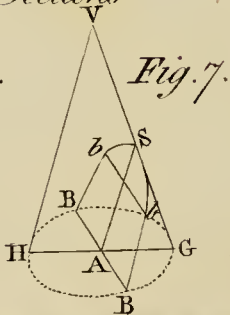
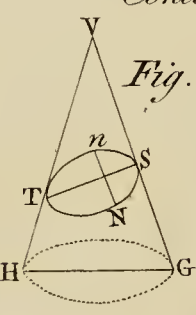
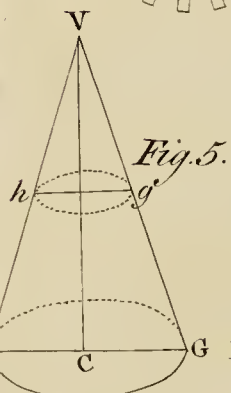


Fig. 2.



Conic Sections





irradiates through all the system, and therefore it ought to be placed in the centre, so that the planets may at all times have it in an uniform and equable manner.

6. For if the earth be in the centre, and the sun and planets revolve about it, the planets would then, like the comets, be scorched with heat, when nearest the sun, and frozen with cold in their aphelia, or greatest distance, which is not to be supposed.

7. If the sun be placed in the centre of the system, we then have the rational hypothesis of the planets being all moved about the sun, by universal law or power of gravity arising from his vast body, and every thing will answer to the laws of circular motion and central forces; but otherwise we are wholly in the dark, and know nothing of the laws and operations of nature.

8. But happily we are able to give not only reasons, but demonstrative proofs, that the sun does possess the centre of the system, and that the planets move about it at the distance and in the order assigned in this and in other places.

The first is, that Mercury and Venus are ever observed to have two conjunctions with the sun, but no opposition, which could not happen unless the orbits of these planets lay within the orbit of the earth.

9. The second is, that Mars, Jupiter, and Saturn, have each their conjunctions and oppositions to the sun alternately and successively, which could not be, unless their orbits were exterior to the orbit of the earth.

10. In the third place, the greatest elongation or distance of Mercury from the sun, is about  $20^{\circ}$ , and that of Venus  $47^{\circ}$ ; which answers exactly to their distance in this system, though in the Ptolemean system they might, and would, sometimes be seen  $180^{\circ}$  from the sun, viz. in opposition in him.

11. Fourthly, in this disposition of the planets they will all of them be sometimes much nearer to the earth than at others; the consequence of which is, that their brightness and splendor, and also their apparent diameters, will be proportionally greater at one time than another; and this we observe to be true every day. Thus the apparent diameter of Venus, when greatest, is near  $66''$ , but when least, not more than  $9''$  and a half; of Mars, when greatest, it is  $21''$ , but when least, no more than  $2''$  and a half; whereas, by the Ptolemean hypothesis, they ought always to be equal.

12. The fifth is, that when the planets are viewed with a good telescope, they appear with different phases, or with different parts of their bodies enlightened. Thus Venus is sometimes new, then horned, and afterwards dichotomized, then gibbous, afterwards full, and so increases and decreases her light in the same manner as the moon, and as the Copernican system requires.

13. The sixth is, that the planets, all of them, do sometimes appear direct in motion, sometimes retrograde, and at other times stationary. Thus Venus, as she passes from her greatest elongation westward, to her greatest elongation eastward, will appear direct in motion, but retrograde as she passes from the latter to the former; and when she is in those points of greatest distance from the sun, she seems for some time stationary: all which is necessary upon the Copernican hypothesis, but cannot happen in any other.

14. The seventh is, that the bodies of Mercury and Venus, in their lower conjunctions with the sun, are hid behind the sun's body, and in the upper conjunctions are seen to pass over the sun's body, or disk, in form of a black round spot, which is necessary in the Copernican system, but impossible in the Ptolemean system.

15. The eighth is, that the times in which these conjunctions, oppositions, stations, and retrogradations of the planets happen, are not such as they would be were the earth at rest in its orbit, but precisely such as would happen were the earth to move, and all the planets in the periods assigned them; and therefore this, and no other, can be the true system of the world.

16. But the truth of this system has been abundantly confirmed by the accurate observations of the learned Dr. Bradley; for it plainly appears from thence, that the fixed stars have an apparent motion or aberration, and seem to describe small circles, or ellipses; which

could never happen, were the earth fixed in the centre; but naturally follows from the motion of the earth's bearing some proportion to the velocity of light; and consequently the earth really revolves about the sun. See ABERRATION.

COPERNICUS, the name of an astronomical instrument invented by the late Mr. Whiston, for exhibiting the motion and phenomena of the planets, according to the copernican system.

COPING, in architecture, the top or covert of a wall made sloping for carrying off the rain.

COPPEL, a small vessel, generally made of bone-ashes, and used by refiners in assaying metals.

COPPER, a hard, heavy, ductile metal, found in mines in several parts of Europe.

It is the lightest of all metals except iron and tin; is more simple in its nature than iron, though greatly less so than gold or silver. It is, next after iron, the hardest metal. It communicates that quality to gold and silver which greatly want it, with which it readily mixes in fusion, and is the best alloy for both. It is malleable much more easily than iron, though not so readily as any of the other metals. It is ductile to a very great degree. In its natural state we see it drawn out into extremely fine wire, and in the form of brass, in which it is only altered in colour by an admixture of a semi-metal called zinc: it is beaten into leaves, which, though not so thin as those of gold, serve for many purposes in their stead.

It is the most liable to rust of all the metals; for all kinds of salts, and all unctuous bodies, in short, almost every thing in nature is a solvent for it. If only exposed to a moist air, it readily acquires a green rust; and even water in time will dissolve it. It is remarkably sonorous, being the basis of almost all the compound metals in which that quality is expected. It requires a very considerable degree of fire to melt it, less indeed than iron, but much greater than that required for the fusion of any of the other metals: on this is founded that easy practice of separating all the other metals, except iron, from copper, by what is called eliquation: for, if the fire be kept up just under the degree necessary to melt a plate of copper, every other metal will be perfectly separated from it, if iron be not there. Copper grows red-hot before it melts, and; when in a state of fusion, is destructive to every body near, if but the least quantity of water be in the way of its course; for a single drop will scatter a vast quantity of melted copper like shot from a gun. It amalgamates with mercury, but not without considerable difficulty: melted with antimony, it readily runs into scoria or vitrifies; and the same effect is produced, though not so suddenly, on fusing it with iron.

The extreme divisibility of this metal almost exceeds imagination. Mr. Boyle observes, that a grain of it, dissolved in an alkali, will give a sensible colour to more than 500000 times its weight of water. It very readily dissolves in aqua fortis, aqua regia, spirit of salt, and in short, in all the stronger, and even the weaker acids; the very mildest of the vegetable tribe being able to produce a green tincture from it, and to acquire an emetick virtue by being suffered to stand in it. The acids make a green solution of it; the alkalies, and particularly the volatile urinous kinds, a blue one that is equal to the finest colour among painters, not excepting the ultramarine.

Copper is not unfrequently found native and malleable, sometimes in small and slender fibres, and sometimes in little globular and irregular masses. However, it is most frequently found in the state of ore, sometimes blended with the strata of stones, where it discovers itself in blue or green efflorescences. The green and blue ochres also are a sort of ores of copper, and the pyrites and marcasites frequently contain large quantities of this metal. There is also a rich kind of copper-ore of a reddish-grey colour; and another of a dusky purple, or blackish colour. But besides all these, there are two other appearances of copper-ore, known by the names of lapis lazuli, and the turcois, or turquoise. See the article LAZULI, &c.

In Germany and Sweden there are very good mines  
S s s of



of copper-ore, and we have some in England little inferior to the finest Swedish ones.

In order to discover whether the pyrites contains any copper, let it be roasted in an open fire, and a solution made by pouring upon it any quantity of warm water: into this solution let iron plates, perfectly clean and free from greafe, be immerfed; and if the pyrites contains any copper, it will stick to thefe iron plates, in form of a fine yellow powder.

As to the method of obtaining copper from the ore this laft being previously washed and powdered, is finelted by means of a black flux, and the metal is found at the bottom of the vefel when cold, in the form of a folid and malleable mafs; which may be further refined, by repeating the operation.

**COPPER-PLATES for Engraving.** Plates of copper well wrought, of the beft copper, and thoroughly polished.

The famous Le Boſſe, in his treatiſe on engraving, has given us the following direftions for polishing copper-plates.

Put the plate upon a board leaning obliquely, and in the bottom of which two nails or points are fixed, to keep it from ſliding off; and then take a large piece of grind-ftone dipt in water, and rub it very ſtrongly once in every part length-ways, and then the ſame breadth-ways, keeping it moiſt with water; and repeat this operation till no hollows appear, nor the leaſt mark made by the hammer in forging, or any other flaws, holes or inequalities. After this take a piece of good pumice-ftone, and rub the plate with it in the ſame manner as was done before with the grind-ftone, till all the ſcratches and marks made of the grind-ftone may, by the pumice-ftone be likewise taken away; and then waſh it thoroughly clean. The ſcratches and marks of the pumice-ftone ſhould then be taken out by rubbing the plate in the ſame manner with a piece of oil-ftone, till all the marks and ſcorings of the pumice-ftone be taken out: and the plate ſhould be then waſhed with water till it be perfectly clean. A proper kind of coal muſt in the mean time be prepared for finiſhing the preparation of the plate, which muſt be done in the following manner:

Take three or four large coals of fallow wood, ſound, and without clefts, and place them together in a fire made on a hearth, and cover them with other burning coals; heaping a quantity of red-hot aſhes upon them. In this manner let them remain, being ſubject to only a ſmall acceſs of air, for about an hour and a half: but the time ſhould be greater or leſs, according to their ſize, that the fire may penetrate into the innermoſt part of them, and expel all the ſmoke that can be driven out; to be certain of which, it is better they ſhould ſtay in the fire rather longer than is neceſſary, than that the time ſhould be unduly ſhortened. When they are fit to be taken out, a veſel of water large enough to hold them ſhould be prepared; and they ſhould be inſtantly thrown into it, and left there to extinguiſh and cool. For this purpoſe ſome uſe urine inſtead of water; but there is no difference, unleſs in the diſagreeable ſmell of the latter. The coals being thus prepared, pick out one, or part of one, ſufficiently large, firm, and free from clefts; and holding it faſt in the hand, ſet one of the corners againſt the plate, and rub it, but without obſerving any particular direftion, to take out the marks or ſcorings of the oil-ftone: but if the coal glide on the ſurface, and take no effect, it is a proof of its not being fit for the purpoſe; and another, that is not ſo faulty, muſt be uſed inſtead of it. This fitneſs may be thus diſtinguiſhed; that the coal, if good, being wet, and rubbed on the copper, will ſeem rough, and grate it with a low murmuring noiſe. When a good coal is obtained, the operation muſt be continued, till not the leaſt ſcoring, flaw or hole whatever, appears: but if the coal itſelf, as will ſometimes happen, be too hard, and leaves traces or ſcores of its own forming, a ſofter one muſt be choſen, and uſed in the ſame manner as the firſt, to remedy the defects of it, and to procure a perfectly clear and even ſurface on the plate.

This is the method directed by Le Boſſe: but the end may be better answered, by firſt wearing out the marks of the planiſhing hammer, by rubbing with emery finely

ground; and then, the plate being waſhed clean, brushing it over with the refiner's aqua fortis; which muſt be ſuffered to lie on till the ebullition it produces begins to decreaſe; and then waſhed off, by immerſing the plate in water, when it will be found to be brought to a better condition to take the burniſh with more certainty, than by the laborious uſe of ſo many ſtones and the coal.

The plate being brought to this ſtate, the poliſhing muſt be finiſhed with a ſteel burniſher, with which it muſt be ſtrongly rubbed: the beſt method of moving the burniſher is not to work it length-ways or breadth-ways, but in a diagonal direftion, from corner to corner, which will more effectually take out all remains of the former ſcorings or lines. The copper muſt be thus burniſhed till it be as bright as a looking-glaſs in every part; but if, when the reſt is thus bright, ſome particular ſpots appear dull, or that any lines remain, ſuch faults ſhould be again worked with the burniſher, till the whole be uniformly ſhining.

#### Explanation of plate XXIV.

The lower compartment of the plate repreſents a ſhop where the workmen are employed in making copper-plates for engravers.

*Fig. 1.* Is a workman employed in ſcraping the ſurface of a copper-plate, in order to take out the marks of the hammer, or any other inequalities. *a*, The copper-plate. *x, x*, the ſcraper. *b*, another copper-plate to be ſcraped. This operation is, indeed, generally performed here with a piece of grind-ftone, as we have already obſerved.

*Fig. 2.* A workman planiſhing a copper-plate. *d*, the plate. *c*, the block or foot of the anvil.

*Fig. 3.* A workman rubbing the plate with a piece of pumice ſtone.

*Fig. 4.* Another workman rubbing the ſurface of the plate with an oil-ftone. The plate is afterwards rubbed with a piece of charcoal, in order to free it entirely from all holes, flaws, or ſcratches, it may ſtill retain. *e*, is a kind of table, ſupported by four legs, and on which the above operations are performed.

*Fig. 5.* A workman who weights the copper.

*Fig. 6.* Another workman ſhewing a copper-plate to an engraver *fig. 7.* *f*, the copper-plate.

#### Upper Compartment of the Plate.

*Fig. 1, 2, 3.* Hammers of different ſizes; the latter is uſed in planiſhing.

*Fig. 4.* An anvil covered with parchment to prevent its ſcratching the ſurface of the plate.

*Fig. 5.* A planiſhing anvil.

*Fig. 6, 7.* Two ſcrapers. They are made of pieces of will tempered ſteel, having an edge on each ſide, and faſtened in a wooden handle with a ferule.

*Fig. 8.* The ſheers for cutting off the rough ſides of the plate.

*Fig. 9.* A ſquare for forming the ſides perpendicular to each other.

*Fig. 10.* The poliſhing table.

*Fig. 11.* A burniſher.

**COPPERAS**, a name given to the ſacitious green vitriol.

The Engliſh copperas is made at Deptford, in the following manner, from pyritæ. See **PYRITES**.

A heap of theſe ſtones, two or three foot thick, is laid in a bed well rammed, where being turned once in fix months, in five or fix years, by the action of the air and rain, they begin to diſſolve, and yield a liquor which is received in pits, and thence conveyed into a ciſtern, in a boiling-houſe. The liquor at length being pumped out of the ciſtern into a leaden boiler, and a quantity of iron added thereto, in two or three days the boiling is compleated; care having been taken all along to ſupply it with freſh quantities of iron, and to reſtore the boiling, whenever it ſeems to abate. When boiled ſufficiently it is drawn off into a cooler, with ſticks acroſs, where it is left 14 or 15 days to ſhoot. The uſes of copperas are numerous. It is the chief ingredient in the dying of wool, cloths, and hats, black; in making ink, in tanning and dreſſing leather, &c. and from hence is prepared oil of vitriol, and a kind of Spaniſh brown for painters. In medicine, it is rarely preſcribed under the name





Fig. 4.

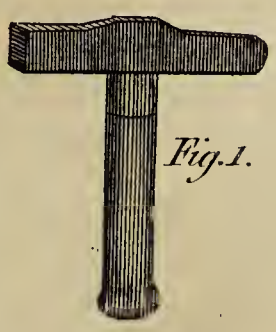


Fig. 1.



Fig. 3.

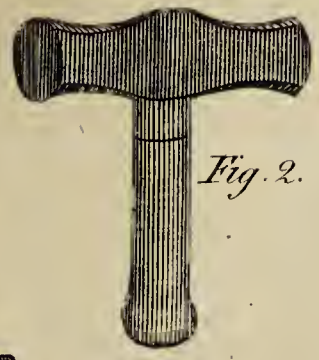


Fig. 2.

Fig. 11.

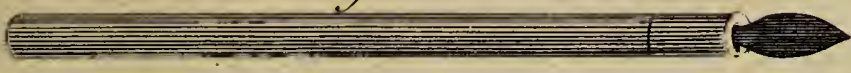


Fig. 6.



Fig. 7.

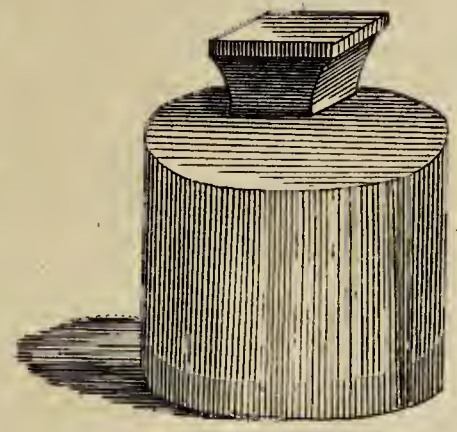


Fig. 5.

Fig. 10.

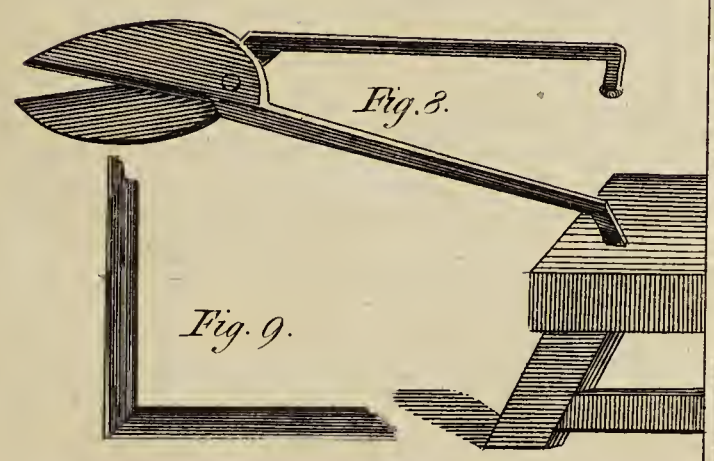
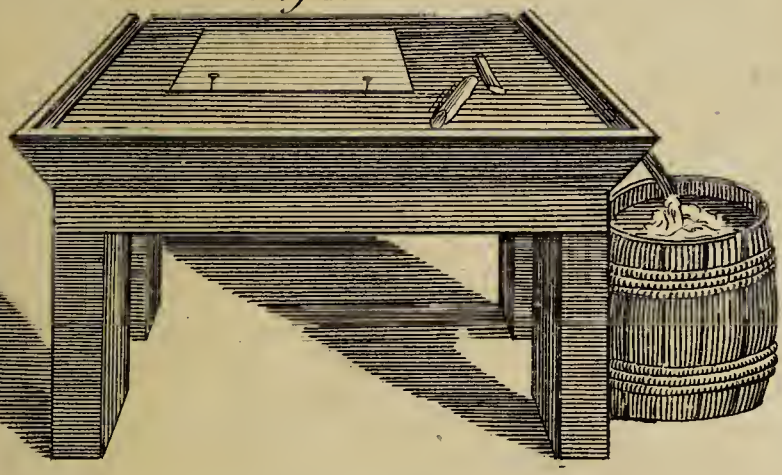


Fig. 8.

Fig. 9.









name of copperas, but it is a true salt of iron, and often prescribed under that name, and used instead of the genuine preparation; our chymists in general giving themselves no further trouble about the making of that salt, than to dissolve and purify the common copperas, and shoot it again into crystals. It is a noble deobstruent, and is a great medicine in the suppression of the menses, but should be used with caution. In large doses it proves emetick, and, in small, is found a good remedy against worms.

**COPPICE**, or **COPSE**, a little wood consisting of under-woods, or such as may be raised either by sowing or planting.

When they are intended to be raised from mast or seed, the ground is ploughed in the same manner as it is for corn: and either in autumn or in spring, good store of such masts, nuts, seeds, berries, &c. are to be sown with the grass, which crop is to be cut, and then the land laid for wood. They may also be planted about autumn, with young sets, or plants, in rows about ten or fifteen feet distance. If the coppes happen to grow thin, the best way of thickening them is to lay some of the branches or layers of the trees, that lie nearest to the bare places, on the ground, or a little in the ground: this detained with a hook or two, and covered with fresh mould at a competent depth, will produce a multitude of suckers, and thicken a copse speedily.

**COPULA**, in logick, the verb that connects any two terms in an affirmative or negative proposition; as “Riches make a man happy;” where *make* is the copula: “No weakness is any virtue;” where *is* is the copula.

**COPULATION**, the act of generation, or the congress of the male and female, otherwise called coition.

**COPULATIVE PROPOSITIONS**, in logick, those where the subject and predicate are so linked together, by copulative conjunctions, that they may be all severally affirmed or denied one of another. Example, “Riches and honours are apt to elate the mind, and increase the number of our desires.”

**COPY**, in a law sense, signifies the transcript of any original writing, as the copy of a patent, charter, deed, &c.

**COPY**, among printers, denotes the manuscript, or original of a book given to be printed.

**COPY-HOLD**, a tenure for which a tenant has nothing to shew but the copy of the rolls made by the steward of the lord's court.

It is called a base tenure, because the tenant holds the land at the will of the lord. However, it is not simply at the will of the lord, but according to the custom of the manor by which such estate is descendible, and the tenant's heirs may inherit it; and a copy-holder, so long as he does his services, and does not break the custom, cannot be ejected by the lord; and if he be, he shall have trespass against him.

Some copy-holds the tenants hold by the verge in ancient demesne; and though held by copy, yet they are a kind of free-hold: and other copy-holds are such as tenants hold by common tenure, called mere copy-hold.

Copy-hold inheritances have no collateral qualities, which do not concern the descent, as to make them assets to bind the heir, or whereof the wife may be endowed, &c. They are not extendible in execution, but are within the acts against bankrupts, and the statutes of limitation.

**COPY-HOLDER**, a person who holds lands, tenelements, &c. by a copy from the manor court.

**COR**, the heart, in anatomy. See **HEART**.

**COR CAROLI**, Charles's heart, in astronomy, an extra constellated star in the northern hemisphere, situated between Coma Berenices, and Ursa Major. It owes its appellation to Dr. Halley, who gave it the name in honour of king Charles II. who founded the royal observatory at Greenwich.

**COR HYDRAE**, a fixed star of the first magnitude, in the constellation of hydra.

**COR LEONIS**, or **REGULUS**, in astronomy, a fixed star of the first magnitude, in the constellation leo.

**CORACOBRACHIALIS**, in anatomy, a muscle

that has its origin at the coracoid process of the scapula, and its termination about the middle part of the arm. It serves to lift the arm obliquely outwards.

**CORACOHYOIDÆUS**, in anatomy, a muscle which having its origin from the upper edge of the scapula, near its neck, ascends obliquely under the mastoidæus, and is inserted in the os-hyoides, which it serves to pull obliquely downwards. See **HYOIDES**.

**CORACOIDES**, in anatomy, a small sharp process of the scapula, so called from its resembling a crow's bill.

The coracoid process in infants, is but a cartilage, afterwards it becomes an epiphysis; and, after this, about the age of sixteen, it is perceived to be a separate bone. It serves to strengthen the articulation of the shoulder, and gives origin to one of the muscles of the arm.

**CORACOMANTES**, in antiquity, persons who foretold events from their observations on crows.

**CORACO-RADIALIS**, in anatomy, the same with biceps. See **BICEPS**.

**CORAL**, *Corallium*, a hard, brittle, branched substance, resembling the stalk of a plant; usually about the thickness of a goose's quill; full of knots, sometimes straight, and sometimes variously bent; both externally and internally of a deep bright red colour. It is found adhering to rocks and other bodies in the sea, particularly in the mediterranean, covered with a soft fungous bark, in which is a great number of cells curiously divided, containing a milky juice, with apertures on the surface: this cortical part is separated while fresh and soft. It has been generally referred to the vegetable kingdom; but is more probably the work and the nest of little animals.

*Artificial CORAL* is made of cinnabar well beaten; a layer whereof is applied on a piece of wood well dried and polished, being first moistened with size; the whole is then again polished, and for varnish rub it over with the white of an egg.

**CORALLINE**, *Corallina*, in botany, is a genus of submarine plants, consisting of stalks and branches often beautifully ramified, and composed of joints of an oblong figure inserted into one another. The greater part of these are gritty, and of a corral-like matter, but nature varies from this in some of the species, which are of a softer substance.

**CORAM NON JUDICE**, in law, is a term used where a cause is brought and determined in a court, the judges of which have not any authority.

**CORBEILES**, in fortification, baskets filled with earth, for making a temporary rampart to a trench, &c.

**CORBEILES**, in architecture, are the representations of baskets, sometimes seen on the heads of the Coryatides.—Builders use the word to signify a short piece of timber placed in a wall with its end projecting out six or eight inches, in the manner of a shouldering piece; but the upper end of it cut into the form of a boutin, ogee, &c.

**CORD**, several threads twisted together by means of a wheel. See the article **ROPE**.

**CORD of Wood**, a certain quantity of wood for burning, so called because formerly measured with a cord. The dimensions of a statute cord of wood are eight feet long, four feet high, and four feet broad.

**CORD-WOOD**, new wood, and such, as when brought by water, comes on board a vessel, in opposition to that which is floated.

**CORDAGE**, a term used, in general, for all sorts of cord, whether small, middling, or great, made use of in the rigging of ships. See **RIGGING**.

**CORDAGE**, cable-laid, as the seamen term it, is made with nine strands, i. e. the first three strands are laid slack, and then three of them, being closed together, make a cable, or cablet. See **CABLE**.

The same for tacks, because they are laid tapering.

Cordage, hawser-laid, is made only with three strands.

Cordage-stays, are cable-laid, but made with four strands, as cables are with three; with the addition of an heart, which goes through the centre of them.

The price of cordage and cable at Peterburgh, in 1742, was one rouble, twenty copecks the ponde.



Cordage stuped, is that which, having been put in a tub in a very warm place, has cast out its moisture.

White cordage, is that which has not yet been tarred.

Cordage tarred, in spinning, is that which is made of rope-yarn ready tarred.

Cordage tarred, in the stove, is that which has passed through hot tar, in coming out of the stove. Every quintal of cordage may take about twenty pounds of tar.

Cordage re-made, is that which is made of ropes used before.

Change cordage, that which is kept in reserve, in case what is in use fails.

When a rope is said to be six inches, it is understood of its circumference. A rope of sixty threads, is one composed of so many rope yarns.

Cordage is usually made of spun hemp: the great number of vessels built and fitted out at Amsterdam, either for war or trade, occasion a great commerce of all sorts of cordage necessary for them, all which sells by the schippont of three hundred pounds. The schippont of cordage of neat hemp costs usually fifty-six florins; that of Muscovy, from thirty to forty-seven. Deductions for weight and prompt payment are one per cent. on each. The quantity of cordage used in rigging a vessel, is almost inconceivable. Every rope hath its name and particular use. As the quantity of cordage is so very extraordinary that is used in our own vessels and shipping, both at home and abroad, and as also the quantities used by all the Europeans, Americans, and Asiatics is immensely great, too much encouragement cannot be given to the growth of hemp in our colonies and plantations, to the end that we might, by that means, at least, amply supply ourselves, if we could not obtain any share in the supply of other nations.

CORDED, in heraldry. *A cross* corded some authors take for a cross wound or wrenched about with cords, but others, with more probability, for a cross made of two pieces of cord.

CORDELIER, in church-history, a Franciscan or religious of the order of St. Francis.

CORDIA, in botany, a genus of plants ranged by Linnæus among the hexandria-monogynia, the corolla of which is formed of a single petal, of an infundibuliform shape: the fruit is a dry, globose, acuminate drupe, covered with the cup: the seed is a sulcate nut, containing two cells.

CORDIAL, in medicine, whatever suddenly raises the spirits, and gives them an unexpected strength and cheerfulness.

CORDON, in fortification, is a row of stones made round on the outside, and set between the wall and the fortrefs, which lies aslope, and the parapet, which stands perpendicular, after such a manner, that this difference may not be offensive to the eye; whence these cordons serve only as ornaments, ranging round about the place, being only used in fortifications of stone-work. For in those made with earth the void space is filled up with pointed stakes.

CORDWAINERS, a term whereby shoemakers are denominated in statutes. By a statute of Jac. I. the master and wardens of the cordwainers company, &c. are to appoint searchers and triers of leather; and no leather is to be sold before searched, sealed, &c.

CORED HERRINGS, a name given to the herrings caught, during the autumn, on the coast of Yarmouth; they are rolled in salt when first taken, and afterwards dried in smoke for red herrings.

COREIA, in antiquity, an annual festival observed in honour of Proserpine.

CORIANDER, in botany, an umbelliferous plant, with finely divided leaves; producing pale, yellowish, or brownish, striated, hemispherical seeds, which are joined by the flat sides, two together. It is annual, a native of Italy, and cultivated in some parts of England.

The leaves of coriander have a strong smell, somewhat of the aromatick kind, but not a little disagreeable. The seeds also have, when fresh, a very unpleasant flavour, which by drying is altered, and becomes tolerably grateful; their taste, in this dry state, is mo-

derately warm and slightly pungent.

The dried seeds are sometimes employed as a stomachick and carminative, though less frequently than the other warm seeds. They give out their virtue totally to rectified spirit, but only partially to water: the spiritus tincture is of a pale bright yellow colour, the watery infusion of a deeper brownish. In distillation with water, they yield a small quantity of a yellowish essential oil, which smells strongly and pretty agreeably of the coriander. Pure spirit likewise carries off, in evaporation or distillation, great part of their flavour, the spirituous extract proving in taste as well as in smell, considerably weaker than the tincture unspissated.

CORIDOR, or CORRIDOR, in fortification, a road or way along the outward edge of the ditch.

CORINTHIAN Order, the fourth order of architecture, according to Scamozzi, but Mr. Le Clerc makes it the fifth, being the most noble, rich, and delicate of all the five.

The proportions of this order are extremely delicate. It is divided into a great variety of members, and enriched with a profusion of ornaments. Scamozzi calls it the *virginal order*; and indeed it has all the delicacy in its make, and all the gaiety in its dress, peculiar to young girls. See *plate XXV*.

The most perfect model of the Corinthian order is generally allowed to be in the three columns in the Campo Vaccino at Rome, the remains, as is thought, of the temple of Jupiter Stator.

The Corinthian column should be 20 modules high, and the entablature 5; which proportions are a medium between those of the Pantheon and the three columns. The base of the column may either be Attick or Corinthian: they are both beautiful. If the entablature be enriched, the shaft may be fluted. The flutings may be filled, to one third of their height, with cablings, as in the inside of the Pantheon; which will strengthen the lower part of the column, and make it less liable to injury.

In most of the antiques at Rome, the capital of this order is enriched with olive-leaves; the acanthus being seldom employed but in the Composite. De Cordemoy, however, prefers the acanthus.

The divisions of the entablature bear the same proportions to each other, as in the Tuscan, Ionick, and Composite orders.

CORK, or CORK-TREE, *Suber*, in botany, makes a distinct genus of trees, according to Tournefort; but is comprehended under the quercus by Linnæus.

In order to peel off the bark, which is the only part that constitutes the substance known by the name of cork, they make an incision round both the top and root of the tree, and another longitudinally; and when it is thus got off, they unwarpe it before the fire, and press it even with weights. This they do once in two or three years, without any prejudice to the tree; provided, however, it be done in a dry season, as rainy weather is accounted extremely prejudicial.

The cork should be chosen in fine boards, all of a piece, not full of knots or chinks, of a moderate thickness, yellowish without and within, and that which cuts even.

Its use is too well known to need any account of it: in medicine it is of service to stop bleeding, being reduced to powder, or put into some astringent liquor: burned and mixed with the unguentum populneum, it is very proper for the piles. The Spaniards burn cork into an extraordinary fine black, called Spanish black, which is used for several sorts of work.

CORK, or CORKING of a Saddle, the pieces to which the bolsters are made fast; so called as having formerly been made of cork.

CORN, in agriculture, the grain or seeds of divers plants, the principal of which are wheat, barley, oats and rye. See each under its proper article.

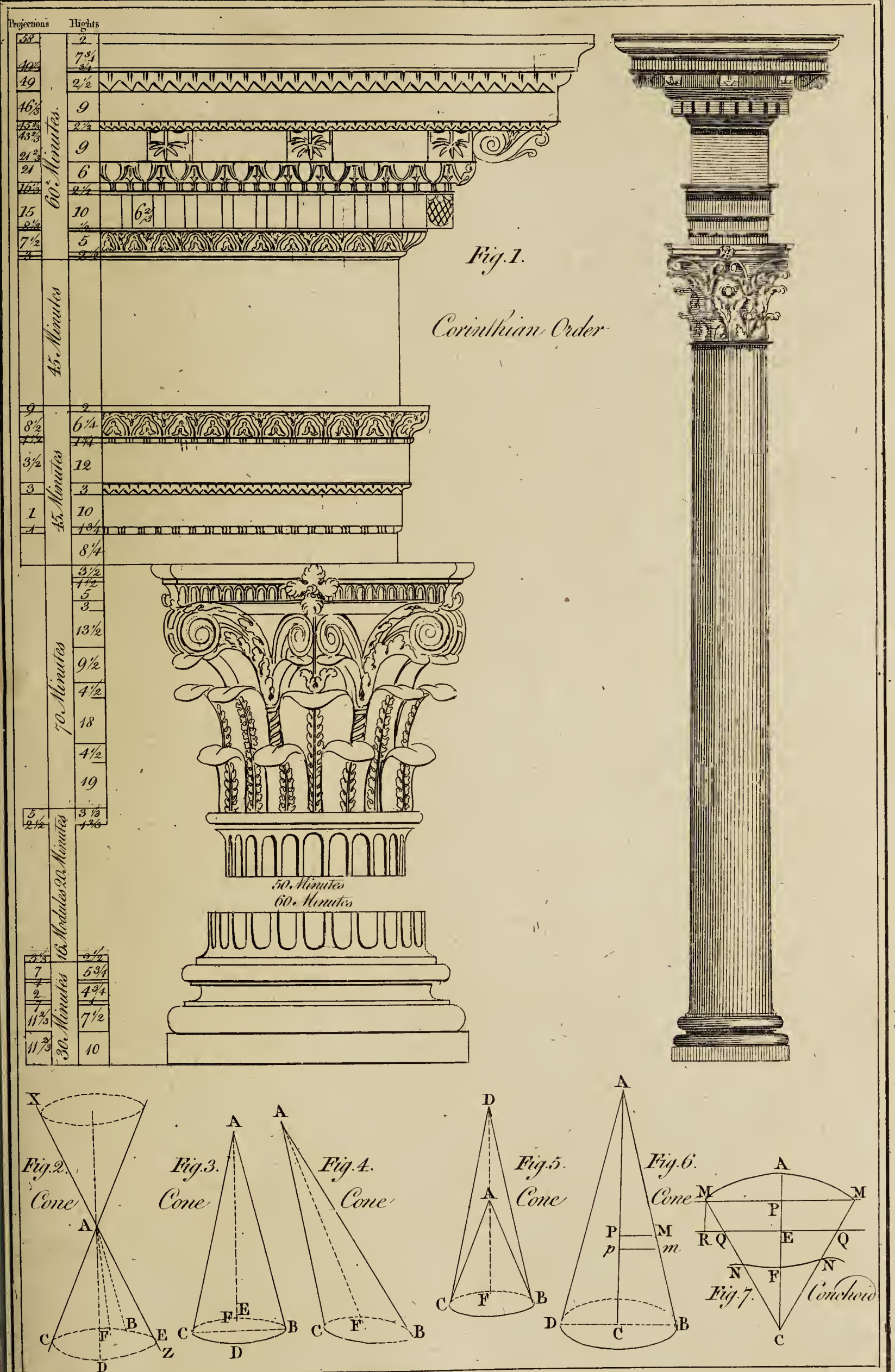
CORN-MILL, an engine for grinding corn. See the articles MILL and GRINDING.

CORNEA TUNICA, in anatomy, the second coat of the eye. See the article EYE.

CORNELIAN. See the article CARNELIAN.

CORNER.











**CORNER-TEETH** of a *Horse*, the four teeth between the middle teeth and tusks, two above and two below, in each side of the jaw. They appear when the horse is four years and a half old.

**CORNET**, in the military art of the ancients, an instrument much in the nature of a trumpet, which, when it only sounded, the ensigns were to march alone, without the soldiers; whereas, when the trumpet only sounded, the soldiers were to move without the ensigns.

**CORNET**, in the military art of the moderns, the third commission officer in a troop of horse or dragoons.

**CORNICHE**, **CORNISH**, or **CORNICE**, in architecture, the uppermost member of the entablature of a column, or that which crowns the order. See any of the Orders.

**CORNICHE-RING**, of a piece of ordnance, is that next the muzzle ring.

**CORNICULARIUS PROCESSUS**, in anatomy, the process or knob of the shoulder-bone.

**CORNICULATE PLANTS**, the same with what are otherwise called filiquose plants with horned pods, or seed vessels.

**CORNISH**, or **CORNICHE**, in architecture. See the article **CORNICHE**.

**CORNU AMMONIS**, or **HAMMONIS**, in natural history, a genus of fossil shells, called serpent-stones, or snake-stones, by the vulgar.

They are found of all sizes, from the breadth of a six-pence, to more than two feet in diameter; some of them rounded, others greatly compressed, and lodged in different strata of stones and clays; some again are smooth, and others ridged in different manners, their striae and ridges being either straight, irregularly crooked, or undulated.

**CORNUCOPIÆ**, or **HORN of Plenty**, among painters, &c. is represented under the figure of a large horn, out of which issues fruits, flowers, &c. Upon medals the cornucopiæ is given to all deities, genii, and heroes, to mark the felicity and abundance of all the wealth procured by the goodness of the former, or the care and valour of the latter.

**CORNUCOPIÆ**, in botany, a genus of plants, the flower of which is univalvular; there is no pericarpium, but the corolla incloses a single turbinate seed, convex on one side, and plane on the other.

**CORNUS**, the cornel tree, in botany, a genus of plants, the flower of which consists of four oblong, acute, plane petals; the fruit is a roundish umbilicated drupe; the seed a cordated or oblong nut, with two cells.

The fruit of this tree is cooling, drying, and astringent, strengthens the stomach, stops all kinds of fluxes and looseness, and is good in fevers, especially if attended with a diarrhœa.

**COROLLA**, among botanists, the most conspicuous part of a flower, surrounding the organs of generation, and composed of one or more flower-leaves, most commonly called petals, to distinguish them from the leaves of the plant: according as there is one, two, or three of these petals, the corolla is said to be monopetalous, dipetalous, tripetalous, &c.

**COROLLARY**, is an useful consequence drawn from something already advanced or demonstrated: thus, it being demonstrated that a triangle, which has two equal sides, has also two angles equal; this corollary will follow, that a triangle which has three sides equal, has also its three angles equal.

**COROLLISTS**, *Corollistæ*, an appellation given by Linnæus to those botanists who have arranged plants under distinct classes, according to the different form of their corollæ or flowers; such is the celebrated Tournefort and Rivinus.

**COROLLULA**, a term used by botanists, to express little partial flowers, which together make up the compound ones.

These corollulæ are of two kinds, the tubulated and ligulated; the former whereof are always furnished with a campanulated limb, divided into four or five segments; and the latter have only a flat linear limb, ter-

minated by a single point, or by a broader extremity, divided into three or five segments.

**CORONA**, *Crown*, or *Crowning*, in architecture, a large, flat, missive member of the cornice; so called, because it crowns not only the cornice, but the entablature, and the whole.

**CORONA**, among anatomists, denotes that edge of the glans penis where the preputium begins.

**CORONA**, among botanists, expresses any thing growing on the head of a seed.

These coronæ are of various kinds: sometimes simple, consisting only of a dentated membrane; sometimes pappose, consisting of downy matter, which in some cases is immediately affixed to the seed; in others it has a pedicle growing from it; and it sometimes is composed of simple filaments, and sometimes is ramose. Hence, in the description of the seeds of plants, they are frequently said to be crowned or winged with down; the use of this part being evidently to scatter and disperse the seeds, when ripe.

**CORONA BOREALIS**, the northern crown, or garland, in astronomy; a constellation of the northern hemisphere, whose stars in Ptolemy's catalogue are eight, in Tycho's as many, and in Mr. Flamsteed's twenty-one.

**CORONA AUSTRALIS**, the southern crown, in astronomy, a constellation of the southern hemisphere; between the fore-legs of Sagittarius. It consists of thirteen stars.

**CORONALIS**, in anatomy, the first future of the skull. It reaches transversely from one temple to the other, and joins the os frontis to the ossa parietalia.

**CORONARY VESSELS**, in anatomy, two arteries which furnish the substance of the heart with blood, and a vein which again conducts the reflux blood back to the heart.

**CORONE**, in anatomy, the anterior apophysis of the lower jaw.

**CORONER**, an ancient officer of this kingdom, and so called from his being wholly employed for the king and the crown.

**CORPORA NERVOSA**, in anatomy, the nervous spongy bodies of the penis.

**CORPORA OLIVARIA**, two protuberances of the medulla oblongata.

**CORPORA PYRAMIDALIA**, two protuberances of the under part of the cerebellum.

**CORPORA STRIATA**, two protuberances in the lateral ventricles of the brain.

**CORPORAL**, an inferior officer under a serjeant in a company of foot, who has the charge of one of the divisions, places and relieves sentinels, and takes care that good order is observed in the corps de garde.

**CORPORAL of a Ship**, an officer who has the charge of setting and relieving the watch and sentinels; takes care that the arms are kept clean, and teaches the men their exercise.

**CORPORAL**, is also a name for the linen cloth thrown over the consecrated elements at the sacrament.

**CORPORATION**, a body politick, or a society of persons joined in one body, either by prescription, charter or act of parliament.

The most usual method, however, of forming corporations is by charter. London, indeed, is a corporation by prescription; but in all bodies politick formed by prescription, it is supposed that they originally derived their authority from a grant of the king.

A corporation may be dissolved, for it is created upon a trust; and if that trust be broken, the charter is forfeited. No person is permitted to bear any office until he has received the sacrament, taken the oaths, &c. and none are to execute in a corporation for more than a year. A corporation cannot sue or appear in person, but by an attorney.

Ordinances made by corporations, to be observed on pain of imprisonment, forfeiture of goods, &c. are contrary to Magna Charta. Actions arising in any corporation may be tried in the corporation courts; but if they try actions not within their jurisdictions, and encroach upon the common law, they are liable to



be punished for it. The corporation of the city of London is to answer for all particular misdemeanors committed in any of the courts of justice within the city, and for all other general misdemeanors committed in the city.

**CORPOREAL**, those qualities which denominate a body.

**CORPORIFICATION**, or **CORPORATION**, in chymistry, the operation of recovering spirits into the same body, or, at least, into a body nearly the same with what they had before their spiritualization.

**CORPS DE GARDE**, a post in the army, sometimes under covert, sometimes in the open air, to receive a number of soldiers, who are relieved from time to time, and are to watch in their turns, for the security of some more considerable post.

Corps de garde is frequently used for the men who watch in this post.

**CORPS DE BATAILLE**, the main body of an army, drawn up in order of battle.

**CORPS**, in architecture, a term to signify any part that projects or advances beyond the nakedness of a wall, serving as a ground for some decoration or the like.

**CORPULENCY**, in medicine, the state of a person too much loaded with fat. Etmuller defines it to be such an increase both of the venter and limbs as to impede the actions of the body; especially motion and respiration. Boerhaave observes, that *Corpulency* does not consist in the solids of the body being increased, but their being distended to a greater pitch by the abundance of humours collected in them. But from whatever cause, it generally indicates a good habit of body, and an easy agreeable temper. Corpulency is promoted by every thing that tends to soften the blood and render it less sharp and saline; such as want of proper exercise both of body and mind, an indolent life, and too much sleep and nourishing foods, &c. And as these cause or promote corpulency, so do their opposites prevent or remove it; particularly saline meats and acid drinks, &c. Some have proposed, as one of the best remedies for corpulency, *Acet. Scilliticum*; but as great mischiefs and sometimes fatal effects have followed from such medicines, particularly in young ladies, in attempting to reduce themselves by drinking vinegar, &c. I would therefore advise proper exercise and moderate eating, with a total abstinence from all kinds of malt liquors, and recommend water for common drink, and cyder or perry to be drank occasionally.

**CORPUS Callosum**, in anatomy, a medullary part of the brain, which covers the whole lateral ventricles.

**CORPUS Pampiniforme**, *Pyramidale*, or *Varicosum*, in anatomy, a body formed a little above the testicles, by the division and re-union of the spermatick veins.

**CORPUS cum Causa**, in law, a writ issuing out of Chancery to remove both the body and record, touching the cause of any man lying in execution upon a judgment for debt, into the King's-bench, &c. there to lie till he has satisfied the judgment.

**CORPUSCLES**, are the minute particles, or physical atoms, of which a natural body consists: but by this word is not meant the elementary particles, nor the hypostatical principles of the chymists, but such particles, whether of a simple or compound nature, whose parts will not be dissolved nor dissipated by ordinary degrees of heat. Sir Isaac Newton, in the second book of his *Opticks*, shews a way of guessing, with great accuracy, at the sizes of the component corpuscles of bodies.

**CORPUSCULAR PHILOSOPHY**, is that way of philosophizing which endeavours to explain things, and to give an account of the phenomena of nature, by the motion, figure, rest, position, &c. of the corpuscles, or minute particle of matter.

**CORRECTION**, in printing, the pointing out or discovering the faults in a printed sheet, in order to be corrected by the compositor, before it is printed off.

**CORRECTION**, in pharmacy, is the adding some ingredient to a composition, which shall check or moderate the violence of its operation.

**CORRECTION**, in rhetoric, is a figure whereby a

man earnestly retracts or recalls what he had said or resolved: as,

First and last

On me, me only, as the source and spring  
Of all corruption, all the blame lights due:  
So might the wrath! fond wish! cou'dst thou support  
That burden, heavier than the earth to bear;  
Than all the world much heavier? *Milton.*

When what an author has said appears too much, he abates it by correcting himself, and using some other expression.—What is it then can give men the heart and courage? But I recall that word, because it is not true courage, but foolhardiness, to outbrave the judgment of God. When what has been said appears too little, he strengthens the expression, and enlarges the thought:—This was a great trouble to me, but that much more, that before my face they thus entertained, caressed, and kissed my enemy: my enemy, did I say? Nay, the enemy of the laws, the courts of justice, of peace, his country, and all good men.—An author, thus correcting and checking himself, prevents cavils and objections; and by the unexpected quickness of the recollection and turn, pleasingly surprises the reader, and all of a sudden fires him with his own passion. The height of the figure is, when a person having lately declared an inclination to a thing, presently rejects it with horror, and vows against it with imprecations:

But may I first in opening earth sink down,  
Or to the lowest hell be thunder-thrown,  
In night's eternal shades shut up beneath,  
Ere I my honour wound, or break my faith.  
*Virg. Æn. iv. Blackwall's Classicks.*

**CORRECTOR**, in medicine, an ingredient in a composition, which guards against or abates the force of another.

**CORROSION**, in chymistry, the action of producing new combinations, and a change of the forms of bodies, without converting them to fluidity.

**CORROSIVES**, in surgery, are medicines which corrode whatever part of the body they are applied to: such are burnt alum, white precipitate of mercury, white vitriol, red precipitate of mercury, butter of antimony, lapis infernalis, &c.

**CORRUGATOR**, in anatomy, a muscle which arises fleshy from the process of the os frontis, next the inner or great angle of the orbit, above the joining of the os nasi and the superior process of the os maxillare with this bone: from thence it runs obliquely outwards and upwards, and is inserted into the fleshy part of the occipito-frontalis, some of its fibrillæ passing through into the skin, a little higher than the middle region of the eye-brows.

**CORRUPTICOLÆ**, in church history, a sect of hereticks, who maintained that the body of Christ was corruptible, and that to deny it was to deny the truth of our Saviour's passion.

**CORRUPTION**, the destruction, extinction, or, at least, cessation for a time, of the proper mode of existence of any natural body.

**CORRUPTION of Blood**, in law, an infection accruing to a man's state, attainted of felony and treason, and to his issue.

**CORSAIR**, in the marine, a name given to the piratical cruises of Barbary, who frequently plunder the merchant ships of countries with whom they are at peace.

**CORSELET**, a little cuirass; or, according to others, an armour or coat made to cover the whole body, anciently worn by the pikemen, usually placed in the fronts and flanks of the battle, for the better resisting the enemy's assaults, and guarding the soldiers placed behind them.

**CORTEX**, bark, in botany. See the article **BARK**.  
**CORTEX Peruvianus**, Peruvian bark, or quinquina. See the article **QUINQUINA**.

**CORTEX Winteranus**, winter's bark, in the materia medica, a thick firm bark, rolled up in the manner of cinnamon, into tubes or pipes; but usually thicker, and always



always shorter, than the fine tubes of cinnamon. It is externally of a greyish colour, and of a reddish brown within; it is properly, indeed, a double bark, the outer and inner of the same tree, not the inner bark alone, separated from the other, as the cinnamon and cassia are. The outer rind is of an uneven surface and of a loose texture, very brittle, and easily powdered. The inner bark, which has the principal virtue, is hard, and of a dusky reddish brown. The outer one is often cracked and open in several places, the inner one never in any. It is of an extremely fragrant and aromatick smell, and of a sharp, pungent, and aromatick taste, much hotter than cinnamon in the mouth, and leaving a more lasting flavour in it.

It is to be chosen in pieces not too large, with the inner or brown part sound and firm, and of a very sharp taste. It is apt to be worm-eaten; but in that case it is wholly to be rejected, as having lost the far greatest part of its virtue.

The cortex winteranus was wholly unknown to the ancients; the first discovery of it among us is owing to captain Winter, who, in the year 1567, went as far as the Streights of Magellan with Sir Francis Drake, but accompanied him no further in that famous voyage in which he went round the world. He found this bark on the coast of Magellan; and bringing a large quantity of it with him in his return to England, it became used in medicine, and was ever after called by his name. It is not, however, peculiar to the place he found it in, but is frequent in many parts of America.

The virtues of this bark were discovered by the English sailors on board captain Winter's ship; they first used it by way of spice to their foods, and afterwards for the scurvy; it is good in palsies and rheumatisms; and a decoction of the leaves is good by way of fomentation, for the parts externally affected by the scurvy. The English sailors made it famous for its virtues against the poison of a certain fish, common about the Magellanick sea, and which they called the sea lion. They eat the flesh of this fish, and fell into many illnesses by it, among which, one was attended with a peeling off the skin of their whole bodies, not without excessive pain; this they remedied by the cortex winteranus; but by the accounts we have of the effects of eating this fish, as they are called, they were rather symptoms of an inveterate scurvy, and therefore it is no wonder this bark did them great service.

**CORTICAL Substance of the Brain**, the exterior part of the brain. See the article **BRAIN**.

**CORUSCATION**, a glittering, or gleam of light issuing from any thing.

**CORVUS**, the raven, in astronomy, a constellation of the southern hemisphere.

The stars in this constellation, in Ptolemy's and Tycho's catalogues, are seven, and in the Britannick thirteen.

**CORYMBIFEROUS Plants**, such as have compound discous flowers, and their seeds destitute of down.

The name is taken from the manner of bearing their flowers in clusters, and spreading round in the form of an umbrella. Of this kind is the corn-marigold, common ox-eye, the daisy, chamomile, mugwort, feverfew, &c.

**CORYMBUS**, in botany, signifies a cluster of flowers or fruit standing on pedicles, which are disposed in such a manner as to form a sphere; of this sort is the ivy, &c.

**CORYPHÆUS**, in the ancient drama, the chief or leader of the company which composed the chorus.

**CORYZA**, in medicine, a running at the nose; or a defluxion of sharp ferous humours from the glands of the head.

**CO-SECANT of an Arch**, is the secant of the complement of that arch.

**CO-SINE of an Arch**, in geometry, is the part of the diameter intercepted between the centre and the right sine, and is always equal to the sine of the complement of that arch.

**COSMETICKS**, in physick, are medicines which render the skin soft and white, or help to beautify and improve the complexion.

**COSMICAL**, a term in astronomy, expressing one of the poetical risings of a star.

Thus a star is said to rise cosmically, when it rises with the sun, or with that point of the ecliptick in which the sun is at that time; and the cosmical setting is, when a star sets in the west at the same time that the sun rises in the east.

**COSMOGONY**, the creation or origin of the world.

**COSMOGRAPHY**, a description of the several parts of the visible world, and consists of two parts, astronomy and geography.

**COSTIVENESS**, *obstructio alvi*, in medicine, a preternatural detention of the fæces, with an unusual dryness and hardness thereof, and thence a suppression of their evacuation. See the article **COLICK**.

If costiveness proceeds from dry hard excrements, a moistening slippery diet of plumbs, cherries, or scalded apples, with or without raisins, should be taken; coffee should be also drank with milk; but the most effectual means to remove these obstructions, to raise the spirits, and the languid fibres of the intestines, are gentle purges, such as purging mineral waters, purging salts, sal mirabile Glauberi, warm water, and the common purging potion, as well as the lenitive electuary, and emollient clysters.

Hoffman says an obstinate costiveness is owing generally to spasms in the intestines themselves, or in the lower part of the colon and rectum; or, as propagated by consent from the more remote parts. The suppression of this evacuation produces scybals, generates flatulencies and other grievous symptoms, especially in hypochondriack and hysterick persons: but when this disease is constitutional, it may be borne a long while without danger.

For costiveness in children, Boerhaave recommends absorbents, and orders seven grains of the testaceous powders, three times a day. The nurse must forbear feeding upon any thing that is sour or acid. Harris believes an acid to be so predominant in infants, as to cause all their diseases.

**COSTMARY**, in botany, a species of tansey; it grows naturally in the south of France and Italy, but is here planted in gardens, and flowers in August.

The leaves are chiefly used in medicine, and are stomachick, cephalick, carminative and deobstruent; they are also externally applied in fomentation and bathing, to strengthen the joints.

**COSTS**, in law, imply the expences of a suit recovered by the plaintiff, together with damages.

**COSTUS Arabicus**, in pharmacy, is a root of the tuberous kind, though of no very regular figure. It is of a dusky whitish or greyish colour on the outside, and of a whiter colour within; of a very fragrant smell, and of an acid taste, somewhat aromatick, and a little bitterish.

It is an attenuant, a diuretick, and a sudorifick; it is given in obstructions of the menses, and in chronick cases in which there are infractions of the viscera. It is an ingredient in the Venice treacle and mithridate; but as it is not frequently found in our shops, its place is generally supplied by the roots of the garden costus, zedoary, angelica, &c.

**CO-TANGENT of an Arch**, in geometry, is the tangent of the complement of that arch.

**COTICE**, in heraldry, is the fourth part of the bend and with us is seldom borne but in couples, with a bend between them.

**COTTON**, in commerce, a soft downy substance, encompassing the seeds of a plant of the same name.

The tree which produces cotton grows common in several places of the Levant, and of the E. and W. Indies, especially the Antilles.

Little engines, by means of a wheel, sever the cotton from the seed, with which it is mixed; so that one falls on one side, and the other on the other. It is distinguished into two kinds, cotton in the wool, and spun cotton. The first is used in quilts, bed-gowns, &c. The latter is more generally used, furnishing various cloths, muslins, calicoes, dimities and hangings; besides, it is frequently joined with silk and flax in the composition of other stuffs.



The first kind is ordinarily brought from Cyprus and Smyrna; from the latter 10000 bales per annum; and yet there is, at least, as much employed in the manufactures of the country.

They sow the seed in June, and gather it in October; and the soil is so favourable that they can have three crops in a year. The spun cottons are distinguished by various names: the best are those from Jerusalem, called bazacks; and those of Damascus, called cottons of the ounce. Others are demi-bazacks, baladins, payas, cottons, josephs, genegunfo's, &c. Cotton anciently grew in Egypt alone, and was used by the priests for a singular kind of gowns, worn by them only.

Cotton applied to wounds in lieu of linen, produces an inflammation; which Leuenhoeck found, by a microscope, to be owing to its fibres having each two flat fides; whence he concludes, that each must have two sharp edges, that not only hurt, but cut incessantly the matter brought to produce new flesh.

COTYLA, or COTULA, a measure of capacity among the Greeks containing ten ounces of wine, and nine of oil.

COTYLA, or COTYLE, in anatomy, signifies any deep cavity in a bone, in which any other bone is articulated; but it is generally used to express the acetabulum, or cavity, which receives the head of the thigh-bone. It also imports a deep sinus surrounded with large lips.

COTYLEDONES, in anatomy, are certain glandular bodies, adhering to the chorion of some animals; but no such substances are observable in the human chorion.

COUCH, among painters, signifies a lay of colour, whether in oil or water, wherewith a piece of canvas, wall, wainscot, or other matter, is covered.

COUCHANT, in heraldry, is understood of a lion, or other beast, when lying down, but with his head raised, which distinguishes the posture of couchant from dormant, wherein he is supposed quite stretched out and asleep.

COUCHE, in heraldry, denotes any thing lying along: thus, chevron couche, is a chevron lying sideways, with the two ends on one side of the shield, which should properly rest on the base.

COUCHER, in our old statutes, denotes a factor. See the article FACTOR.

COUCHING, among sportsmen, denotes the lodging of a boar.

COUCHING of a Cataract, in surgery, implies the method of curing a cataract, by depressing it with a needle. See the article CATARACT.

COUGH, in medicine, a convulsive motion of the diaphragm, muscles of the larynx, thorax, and abdomen, violently shaking and expelling the air that was drawn into the lungs by inspiration.

The action of coughing seems to be a composition of two motions directly opposite, viz. of inspiration and expiration. Inspiration is the charge, and expiration the discharge; and the cough is the effect of the latter, to unburden the trachea of its superfluous moisture, which, by a shake, jar, or twang of the windpipe, arising from a violent expiration, the cause of the cough is turned into a fine subtle halitus which arises with force, and for that time eases the patient of his pressure; and, as the trachea is more or less even, and the expiration more or less sudden or quick, so is the cough more or less distinct; though it must be confessed the sound of the cough seems in some measure to depend on the force of percussion with which the fine halitus strikes the external air at its first discharge from the wind-pipe, in the nature of explosions made by several bodies strongly vibrated against the air. But as long as the same cause remains, so long will the same oppression return, and call continually for the same means to remove it; that is, the frequency of coughing will return, in proportion to the quantity of matter separated by the tracheal glands; and the time that matter is secreting, the sound of the cough is differently modulated, according as the upper part of the epiglottis is differently affected; if it be dry, then the cough sounds hollow; if moist, then harsh, attended with a hoarseness. The cough of some,

under a tabes dorsalis, is observed to sound like the crow of a turkey-cock, which we take to be little different from the cough of an eunuch. And thus we account for these catarrhs and defluxions of rheum, that the ancients supposed fell from the head upon the palate and lungs, and which indeed are effects of the bronchial glands, after they have lost their spunginess. A cough is either habitual, accidental, or hereditary. An accidental cough may be occasioned by a sudden alteration of weather, changing cloaths, hard drinking, or catching of cold, as it is commonly called; whether that be a stoppage of perspiration, whereby the lungs and glands about the head and throat are overloaded with lymph; or whether the nitrous, or rather some other particles of the air, in this case insinuating themselves into, and loosening the texture of the blood, permit the serum to go off by expectoration, or through the nostrils, while the red part remains behind. An habitual or natural cough may proceed from a particular weakness of vessels, or some fault in the constitution. That kind which is called hereditary may, it is thought, be received from the parents, or be owing to some particular organization of the body. In pituitous coughs, the matter is often so viscid as to lodge in the foramina superciliaria, and glands of the trachea; so that the more fluid parts running back, perhaps, wash off the mucus, designed to defend the trachea, leaving it bare, and exposed to the injuries of the air; from whence, perhaps, proceed the hoarseness, excoriation, and the asthmatick symptoms, which so frequently happen in coughs. An hereditary cough is reckoned incurable; dry ones and those of long standing have no cure. A sudden stoppage of expectoration, happening a pleurisy or peripneumonia, in those who are subject to hæmorrhages, hoarseness, or an asthma, is accounted a bad prognostick; especially where the thorax is naturally freight, or the person aged. Breakings out about the mouth and nose portend a critical solution.

Let the patient, if possible, keep uniformly warm; the diet should be liquid rather than solid; linseed-tea is of service, and so are the common white and black troches; in weak constitutions and in old age, where expectoration is languid, a glass of wine and good broths are allowable; but malt liquor or salt meats, aromatics, and high fauces, are supposed to do harm.

COVIN, among lawyers, a deceitful compact between two or more persons to prejudice another.

COULTER, in husbandry, an iron instrument fixed in the beam of a plough, and serving to cut the edge of each furrow. See the article PLOUGH.

COUNCIL, in a general sense, implies an assembly of persons to concert measures of state.

COUNCIL, in ecclesiastical history, is an assembly of prelates and doctors, convened together for regulating affairs, either with regard to the doctrine or discipline of the church.

National COUNCIL, implies an assembly of the prelates of a nation under the primate or patriarch.

Oecumenical or general COUNCIL, is an assembly of the bishops, &c. of all the churches in Christendom.

COUNCIL of War, an assembly of the principal officers of an army or fleet, called occasionally by the general or admiral to concert measures for their conduct.

COUNSELLOR, in a general sense, implies a person who advises another; as a counsellor at law, a privy-counsellor, &c.

COUNT, a nobleman who possesses a domain erected into a county. Foreigners still use this term, but we have changed it for that of earl.

COUNT WHEEL, in clock-work, is a wheel in the striking part of a clock, moving once round in twelve or twenty-four hours. Some call it the lockin wheel, because it has commonly two notches in it at equal distances from one another, in order to make the clock strike. It is driven round by the pinion of report. See the article CLOCK.

COUNTER, a term used in the composition of various words of the English language, and generally implies opposition; but when applied to deeds, tallies, or the like, signifies an exact copy, &c. kept by the contrary party.



**COUNTER**, in ship-building, a concave arching under the ship's stern, to which it is parallel.

**COUNTER-POINT**, in musick, the art of composing harmony, or of disposing the several parts in such a manner as to form, when performed, an agreeable concert.

**COUNTER-POISE**, a weight, which sliding along the beam of the steel-yard, determines the weight of bodies weighed by that instrument. See **BALANCE**.

**COUNTY**, in geography, originally signified the territory of a count or earl; but at present is used in the same sense with shire, or one of the divisions of Great Britain.

**COUPED**, *coupé*, in heraldry, is used to express the head, or any limb of an animal, cut smooth off from the trunk.

**COUPLET**, in poetry, generally signifies a couple of verses; but more properly a division of a hymn, song, &c. containing an equal number or equal division of verses.

**COURIER**, a messenger sent post or express, to carry dispatches, &c.

**COURSE**, in navigation, that point of the compass on which a ship steers; or the angle intercepted between the track of a ship and the meridian. See the articles **RHUMB** and **SAILING**.

**COURSE**, in architecture, a continued range of stones, level, or of the same height throughout the whole length of the building, without being interrupted by any aperture.

**COURSE of Plinths**, the continuity of a plinth of stone, or plaister, in the face of a building, to mark the separation of the stones.

**COURSES**, in a ship, the main-sail and fore-sail: when the ship sails under them only, without lacing on any bonnets, she is then said to go under a pair of courses.

**COURT**, *Curia*, in a law sense, the place where judges distribute justice, or exercise jurisdiction: also the assembly of judges, jury, &c. in that place.

Courts are divided into superior and inferior, and into courts of record and base courts: again, courts are either such as are held in the king's name, as all the ordinary courts, or where the precepts are issued in the name of the judge, as the admiral's court.

The superior courts are those of the king's-bench, the exchequer, and the court of chancery.

A court of record is that which has a power to hold plea, according to the course of the common law, of real, personal and mixt action; where the debt or damage is forty shillings, or above, as the court of king's-bench, &c.

A base court, or a court not of record, is where it cannot hold plea of debt, or where the proceedings are not according to the course of common law, nor enrolled; such as the county-court, courts of hundreds, court-baron, &c.

**COURT of Delegates**, is a court where commissioners or delegates are appointed by the king, under the great seal, in an appeal made from the sentence of some other court to himself.

**COURT-BARON**, a court held by every lord of a manor within his own district.

**COURT-LEET**, a court ordained for the punishment of offences under high-treason against the crown.

**COURT-MARTIAL**, a court appointed for the punishment of offences in officers, soldiers, and seamen; the powers of which are regulated by the mutiny-bill.

**COURTESY of England**, a certain tenure, whereby a man marrying an heiress seized of lands in fee-simple or fee-tail, or seized as heir of the tail-special, and getteth a child by her, that cometh alive into the world; though both it and his wife die forthwith, yet if she were in possession, he shall keep the land during his life, and is called *tenant per legem Angliæ*, or tenant by the courtesy of England; because this privilege is not allowed in any country except Scotland, where it is called *curialitas Scotiæ*.

**COUSSINET**, in architecture, the stone that crowns a piedroit, or pier, the under side of which is level, and the upper curved to receive the first spring of

an arch or vault. It is also the face on the side of the volutes in the Ionick capital, which the French artists call balustre and oreiller.

**COUSU**, in heraldry, signifies a piece of another colour or metal placed on the ordinary, as if it were sewed on, as the word imports.

**COW**, in zoology, the female of the ox kind.

Cows are very serviceable to the husbandman for work, and for the supply of the family and market. The best breed is reckoned that of Yorkshire, Derbyshire, Lancashire, Staffordshire &c. and a good hardy sort for fattening on barren or middling sort of land, are your Anglesey's and Welsh. The hardiest are the Scotch: but the best sort of cows for the pail, only they are tender, and require very good keeping, are the long-legged, short-horned cow, of the Dutch breed, which are to be had in some places of Lincolnshire, but mostly in Kent; many of these cows will give two gallons of milk at a meal: but in furnishing yourself with cattle, you ought to consider the goodness of your land, and the use you design your cattle for, as whether for breed, milk, or work.

If for breed, the better your land is, the larger may your kine be; and the cheaper, the more will be your profit: only observe, that of what kind soever your breed is, that it be the best of the sort, and let your bull be of the same country with your cow, for a mixed breed is not reckoned to be so good.

The cow ought to have a good forehead, black eyes, large clean horns, her neck long and thin, a large deep belly, thick thighs, round legs, short joints, a white large deep udder, having four teats, and her feet large. As for the size of your cows, as of all other cattle, it must be suited to the goodness of your land, though the largest commonly give the most milk; and whether you design them for breed, fattening, or the dairy, let them be such as come off a worse ground than your own, if possible. The best time to breed calves is from three years old to twelve.

For a fortnight or three weeks before a cow calves, put her into good grass; or, if it be in winter, give her hay; and be sure to keep her in the house the first day and night after she has calved, and let a little of the cold be taken off the water which you give her: the next day, if well, and she be well cleaned, turn her out about the middle of the day, and take her in two or three nights more, giving her water a little warmed every morning, before you turn her out.

**COW-LEASE**, pasture, or meadow ground, kept for feeding of cows.

**COW-PARSLEY**, the name of a plant common in pasture grounds, and of which cows are said to be very fond. This plant should be rooted out of all pastures, for it is one of the most early plants in shooting, so that by the beginning of April its leaves are near two feet high. The seeds of this plant spread greatly over the ground, and as the roots are perennial, so they are often very troublesome weeds to destroy.

**COWARD**, in heraldry, a term given to a lion borne in an escutcheon with his tail doubled, or turned in between his legs.

**COWL**, or **COUL**, a habit worn by the Bernardines and Benedictines, of which there are two kinds, one white, very large, worn in ceremonies; the other black, worn on ordinary occasions in the streets, &c.

**COXENDIX**, in anatomy, a general term for the hip.

**CRAB**, in naval affairs, a sort of wooden pillar let down through a ship's decks, having its lower-end resting in a socket called a sawcer; and in the upper-end two or three holes above one another through the middle of it, into which long bars are let, whose length are nearly equal to the breadth of the deck. It is used to heave in the cable, or purchase any other weighty matter which requires a great mechanical power. This machine differs from a capstern in having no drum-head, and in having the bars to go entirely through it, and reach from one side of the deck to the other; whereas those of the capstern are more in number, and only reach about eight inches or a foot into the drum-head, according to their different sizes.



**CRAB**, in zoology, the English name of a shell-fish too well known to need description.

**CRABS-CLAWS**, *Cheleæ Cancrorum*, in the materia medica, the black tips of the claws of the common crab, broken off and reduced by pounding and levigation to a fine powder of a whitish colour; the black colour of the claws being merely superficial. The powder of crabs claws is one of the principal alkaline absorbents, and is found, on a chymical analysis, to contain a volatile urinous salt.

**CRABS-EYES**, *Oculi Cancrorum*, in the materia medica, are strong concretions found in two separate bags, one on each side of the stomach of the crab-fish.

We have them from Holland; they are brought also from Muscovy, Poland, Denmark, Sweden, and many other places: what we have are, some of them, probably taken out of the bodies of the animals, but the far greater part are picked up on the shores of the Baltick, and of other seas and large rivers.

They are alkaline and absorbent, and in some degree diuretick: they are sometimes prescribed singly, and are an ingredient in many of the officinal compositions.

**CRAMP**, in medicine, a convulsive contraction of a muscular part of the body, being either natural, as in convulsive constitutions, or accidental, from living in cold places, under ground, &c. It affects all parts indifferently, but the ham, calves, feet, and toes, oftener than the arms and hands: it is seldom mortal, though its returns are often quick, and continuance long, with great pain and distention of some vessels, as appears from the knots and ganglions it occasions. If it be natural, observe the cure, as in an epilepsy or convulsions; if accidental, it is removed by rubbing the part affected.

**CRAMP-FISH**, the English name of the *Torpedo*. See the article *TORPEDO*.

**CRAMP-IRON**, a piece of iron bent at each end, serving to fasten together stones, pieces of wood, or other materials used in building.

**CRAMPONEE**, in heraldry, an epithet given to a cross, having a cramp, or square piece of iron, at each end.

**CRAMPOONS**, pieces of iron hooked at the ends, for hoisting up timber, stones, &c.

**CRANE**, a machine greatly used in building and commerce, for raising large stones and other weights.

A crane is an instrument of such general use, that we cannot help giving its description here. It is of two kinds; in the first, only the gibbet moves upon its axis; and, in the second, called the rat's-tailed crane, the whole crane, with its load, turns upon its axis.

The first sort of crane is represented by (plate XXIII. fig. 9.) seen in profile. *L B E D* is a section of that part of a wharf on which it is fixed, *L B* being the horizontal line. *A C* is a strong horizontal piece of timber making the upper part of the crane, into which are framed the three upright pieces *X*, *Y*, *Z*, (of which the last, called the main piece, is stronger than the others) with its fill *I E* and its braces *H I* and *b E* longer and stronger than the braces and fills *M M* and *D S* of the other two upright pieces, and pinned with iron, where the others are only pinned with wood. When the wharf is not of stone-work where the crane is fixed, the three fills must be all in one piece, reaching from *D* to *E*. Four braces, such as *K*, join the upright to the horizontal pieces. To the above mentioned horizontal pieces is fastened, with strong iron pins, a short piece *p p*, having a bell-metal collar to receive the iron pivot or axis of the upright shaft *R F*, which is an axis in peritrochio, whose lower end of the axis is also of iron, turning in another bell-metal collar let into the firm piece of wood *F*. This axis in peritrochio, instead of a wheel, has four bars, *e*, *f*, *d*, and another behind *d*, going through its thicker part, which is eight square, the upper part being round to receive the rope. When this piece is hooped with iron above and below *d*, it is best to use but two bars instead of four, pushing them quite through at *e b*, and men at each end of them go round in the direction at *b O e*, to wind up the rope, and raise the weight at the end of it. This upright wooden axle, with its bars, is called the capstan of the crane (every such axle being called a capstan when it

turns in a perpendicular situation, like that of the capstanes in ships, and windlasses when it runs in a horizontal position, though it should be for the same purposes as the other) and the rope *R r r*, which goes first over the pulley or roller *T*, then between the pullies *P* and *Q*; and lastly, over the pulley *r*, has at its ends a double iron hook, called a ram's head, to which the goods to be craned up are fastened. The gibbet *G V B* is moveable upon its axis *C B*, by means of the iron centre pins or pivots at its ends *B* and *C*, so that when the weight is raised up sufficiently high, by a small rope fastened to it, or to the end of the gibbet at *g*, it may easily be brought from over the ship or barge, supposed on the water at *W*, to a cart, or any other carriage on the wharf towards *w* on the right and left of the piece *Z*. There is a roof or small wooden shed *A a Q* to shelter the rope from rain, when the crane is not in use, the gibbet being brought under it towards *Y*.

Fig. 10. shews the plane of the upper part of the crane, or, as it would be seen from above, where we are to observe the position of the pullies *P* and *Q*, and of the place of the centre of the gibbet which must be at *C*, in a line touching the circumference of both pullies; for if the said centre of motion of the gibbet were in a line with the centre of the pullies, the gibbet, when loaded, would require a force to bring its end *g* (fig. 9.) over the wharf on either side, and that force ceasing to act, the weight and gibbet would run back and rest over *W*.

This crane is very expeditious with many hands, it being always requisite that some should stand at the bars to keep the weight from running down again, which might be of dangerous consequence: but if, instead of the capstan at *O*, there was an iron endless screw, and horizontal wheel and axle (commonly called the worm and wheel) fixed to the piece *X* made very strong for that purpose, or a machine in the manner of (fig. 3.) only with a pinion instead of a screw at *G H*, making the axis *E F* short, and the axis *M* long, to receive the rope; then two men, nay, sometimes one man, may easily draw goods up from a barge; because, by the resistance of the screw against the teeth of the wheel, the machine will hold the weight at any height, while the man quits the handle to bring the weight, by the guide-rope fastened at *g* (fig. 9.) over a cart on the wharf to receive it; and yet the weight will go down gently of itself, if a man, with a sudden jerk, sets the handles a-going the contrary way to that whereby he raised the weight which is convenient for loading the cart. N. B. This sudden impulse on the handles does to the screw what a blow does to the wedge to set it a-going. As this last sort of crane with a worm and wheel does very much increase the force of the power, I need not put the reader in mind, that more time must be spent in raising the weight; because the velocity of the weight, compared with that of the man's hand who turns the handle, must be diminished in a reciprocal proportion of the intensity of the weight to the intensity of the man's force; this being true in all compound as well as simple engines.

Fig. 4. represents the rat's-tail crane, not only useful in a wharf to crane up heavy goods, but also of great service in building, to raise great stones, and bring them round to any designed place. It consists of the following parts: on the cross-ground fills *L, L, L, L, L, L*, is supported and fixed, by oblique braces, the strong upright piece *K*, called the gudgeon of the crane, on whose upper part or spindle *S*, covered with iron (and sometimes made wholly of iron) the whole machine turns, being easily moved, when it is charged with its load *H*. *C A* is the counter-wheel with its axis *D B*, bearing only on the iron ends of the said axis in two hanging perpendicular pieces at *B* and *b*: *f F* is the brace and ladder, whose top *F* carries the pulley above the weight, the other pullies being in the ends of the pieces *M, N, E*; the remaining parts are too plain in the figure to need further explanation. The power is sometimes applied by means of a rope on the outer circumference of the wheel *A*, but most commonly men, or an horse, turn the wheel round by walking in it. Sometimes also strength is gained by having the counter-wheel made with teeth, and giving motion to its circumference by means of a pinion.



**CRANE**, is also the popular name for the siphon. See the article **SIPHON**.

**CRANE'S-BILL**, among surgeons, a particular kind of forceps, so called from its figure.

**CRANE'S-BILL**, in botany, the English name of the geranium. See **GERANIUM**.

**CRANIUM**, the skull, in anatomy, a considerable cavity, containing the brain as in a box. It is composed of several pieces, proportional to the size of the brain. See the article **SKELETON**.

**CRANK**, in mechanicks, a contrivance in the form of an elbow, but of a square form, projecting from a spindle, and serving, by the rotation, to raise and fall the pistons of engines.

**CRANNY**, among glass-makers, signifies an iron instrument for forming the necks of the glasses.

**CRAPE**, in commerce, a light transparent stuff, made with raw silk gummed; and twisted in a mill.

**CRASIS**, among physicians, implies such a proper mixture of different qualities in the human body, as constitutes a state of health.

**CRASSAMENTUM**, the thick, red, or fibrous part of the blood, in contradistinction to the serum or aqueous part.

**CRATER**, the cup, in astronomy, a constellation of the southern hemisphere, containing in Ptolemy's catalogue seven, in Tycho's eight, and in the Britannick eleven stars.

**CRAYON**, among painters, a composition of colours reduced to the texture of chalk, and used dry, in the form and manner of pencils, for painting on paper.

**CREAM**, the fat or butyrous part of the milk floating on the surface.

**CREAM of Tartar**, or *Crytals of Tartar*, in the materia medica, a preparation, or rather, a refined tartar, prepared by dissolving the crude tartar in water, pouring the lixivium through a filtering bag, evaporating the liquor till a pellicle appears on the surface, and then letting the dissolved tartar shoot into crystals.

Cream of tartar is a gentle purge. It attenuates and resolves tough humours, and is good against obstructions of the viscera, and in cachetick complaints.

**CREATION**, the producing something out of nothing, which, strictly speaking, can be affected by no other power than that of the Divine Being.

**CREDENTIALS**, letters of recommendation and credit; especially such as are given to ambassadors, plenipotentiaries, &c. sent to foreign courts.

**CREDIT**, in commerce, a mutual trust or loan of merchandize or money, on the reputation or probity and sufficiency of a dealer.

Credit is either private or publick.

Every considerable trader ought to have some estate, stock or portion of his own, sufficient to carry on the traffick he is engaged in: they should also keep their dealings within the extent of their capital, so that no disappointment in their returns may incapacitate them to support their credit: yet traders of worth and judgment may sometimes lie under the necessity of borrowing money for the carrying on their business to the best advantage; but then the borrower ought to be so just to his own reputation and to his creditors, as to be well assured that he has sufficient effects within his power, to pay off his obligations in due time: but if the trader should borrow money to the extent of his credit, and launch out into trade, so as to employ it with the freedom as if it was his own proper stock, such a way of management is very precarious, and may be attended with dangerous consequences. Merchants ought never to purchase their goods for exportation upon long credit, with intent to discharge the debt by the return of the same goods, for this has an injurious influence upon trade several ways; and if any merchant has occasion to make use of his credit, it should always be for the borrowing of money, but never for the buying of goods: nor is the large credit given to wholesale traders a prudential or justifiable practice in trade.

The publick credit of a nation is said to run high, when the commodities of that nation find a ready vent, and are sold at a good price, and when dealers may be

safely trusted with them; also when lands and houses find ready purchasers; and money is to be borrowed at low interest: when people think it safe and advantageous to venture large stocks in trade; and when notes, mortgages, &c. will pass for money.

**CREDIT**, was anciently a right which lords had over their vassals, consisting herein, that during a certain time they might lend them money.

**CREDITOR**, a person to whom any sum of money is due, either by obligation, promise, or otherwise.

Creditors shall recover their debts of executors or administrators, that waste or convert to their use the estate of the deceased. The laws of the twelve tables, which were the foundation of the Roman jurisprudence, permitted the creditor to tear or cut his debtor to pieces, in case he proved insolvent.

**CREDITOR**, in book-keeping. See the article **BOOK-KEEPING**.

**CREED**, a brief summary of the articles of a Christian's belief.

The most ancient form of creed is that which goes under the name of the apostolick creed; besides this, there are several other ancient forms and scattered remains of creeds to be met with in the primitive records of the church. The first is a form of apostolical doctrine, collected by Origen; the second is the fragment of a creed preserved by Tertullian; the third, remains of a creed is in the works of Cyprian; the fourth, a creed composed by Gregory Thaumaturgus, for the use of his own church; the fifth, the creed of Lucian the martyr; the sixth, the creed of the apostolical constitutions. Besides these scattered remains of the ancient creeds, there are extant some perfect forms, as those of Jerusalem, Caesarea, Antioch, &c.

The most universal creeds are the apostolical, the athanasian, and the nicene creeds.

**CREEK**, the part of an haven where any thing is landed from the sea.

It is defined by some to be a shore or bank, on which the water beats, running in a small channel from any part of the sea.

**CREEPER**, in ornithology, a name given to several species of ispida, otherwise called certhia, or certhus, and in English the ox-eye.

**CREEPER**, at sea, a sort of grapnel, but without flukes, used for recovering things that may be lost over-board.

**CRENGLES**, among seamen, small ropes spliced into the bolt-ropes of the sails of the main-mast, and fore-mast, into which the bowling bridles are made fast.

**CREMASTER**, in anatomy, the name of a muscle of the testicle, of which there is one on each side.

It arises fleshy from the lowest and fore-part of the os ilium, and upper part of the ligamentum pubis: its fibres running parallel with those of the oblique ascends, and almost encompassing the process of the peritonæum, descends with it, and is inserted into the tunica vaginalis, upon which it spreads in several distinct portions.

**CRENATED**, among botanists, is said of leaves, the edges of which are furnished with indentings, contiguous to each other, and neither inclining toward the point nor base. Of these some are acute, others obtuse, &c.

**CRENELLE**, or embattled, in heraldry, is used when any honourable ordinary is drawn, like the battlements on a wall, to defend men from the enemies shot.

**CREPUSCULUM**, the twilight, in astronomy. See the article **TWILIGHT**.

**CRESCENT**, *Crescens*, the new moon, which, as it begins to recede from the sun, shews a little rim of light, terminating in points, called horns, that are still increasing, till it is in opposition to the sun, at which time it is full moon, or quite round.

**CRESCENT**, in heraldry, a bearing in form of a new moon.

**CRESCENT**, is also an order of knights, instituted by Renatus of Anjou, king of Sicily, about the year 1448, so called from the badge of this order, which was an enamelled crescent of gold.

**CRESCENT**, a term among farriers. Thus a horse



is said to have crescents, when that part of the coffin bone which is most advanced falls down and presses the sole outwards, and the middle of his hoof above shrinks, and becomes flat, by reason of the hollowness beneath it.

CRESS, or *Garden Cresses*, in botany. See the article *NASTURTIUM*.

CREST, in armoury, the top part of the armour for the head, mounting over the helmet in manner of a comb or tuft of a cock, deriving its name from *crista*, a cock's comb.

CREST, in heraldry, the uppermost part of an armoury, or that part of the cask or helmet next to the mantle.

CREST, among carvers, an imagery, or carved work, to adorn the head or top of any thing, like our modern corniche.

CREST-FALLEN, a fault of an horse, when the upper part of his neck, called the crest, hangs to one side: this they cure by placing it upright, clipping away the spare skin, and applying plaisters to keep it in a proper position.

CRETA, chalk, in natural history. See *CHALK*.

CREUX, a French term used among artists, and literally signifies a hollow cavity or pit, out of which something has been scooped or dug: whence it is used to signify that kind of sculpture where the lines and figures are cut and formed within the face or plane of the plate, or matter engraved; and thus it stands in opposition to relieve, where the lines and figures are embossed, and rise prominent above the face of the matter engraved on.

CRIB, a frame of wood, wherein moist things, particularly salt, as is taken out of the boiling-pan, are put to drain.

CRIBRATION, in pharmacy, the passing any substance through a sieve or searce, in order to separate the finer particles from the grosser, whether the body be dry and reduced to powder, or moist, as the pulps of seeds, fruits, or roots.

CRICOARYTÆNOIDUS, in anatomy, a name given to two muscles of the larynx, called the cricoarytænoides posticum, and the lateral cricoarytænoides: they serve to dilate the glottis.

CRICOIDES, in anatomy, a cartilage of the larynx, called also the annular cartilage. It occupies the lowest part by way of base to the rest of the cartilages; and to the lower part of it the aspera arteria adheres.

CRICOTHYROIDÆUS, in anatomy, one of the five proper muscles of the larynx, which arise and terminate it. It serves occasionally either to dilate or constrict the glottis.

CRIMSON, one of the seven colours of the dyers, consisting of a scarlet mixed with blue.

CRINGLE, in naval affairs, a small hole made in the bolt-rope of a sail, by intertwisting one of the divisions of a rope called a strand, alternately round itself, and then through the bolt-rope till it becomes three-fold: the use of a cringle is to fasten the ropes to, which gather up a sail to the yard, when it is to be reefed or furled.

CRINONES, among physicians, small worms that breed in the skin. They occasion a troublesome itching, and are destroyed by a mercurial lotion.

CRISIS, among physicians, implies a sudden change in a disease, either towards a recovery or death.

CRISTA GALLI, in anatomy, a process of the ethmoides, forming the upper part of the septum narium.

CRITERION, a standard or rule, with which propositions and opinions are composed, in order to discover their truth or falsehood.

CRITICAL DAYS, among physicians, are those days in which some crisis happens.

CRITICISM, the art of judging with propriety concerning any discourse, writing, hypothesis or opinion.

CRIZZLING, a term applied to glass that is scabrous or rough on the surface.

CROCHES, among the hunters, the little buds growing about the tops of deers horns.

CROCODILE, the largest species of the lizard kind; some being twenty-five feet in length. It is a native of the torrid Zone, and found in most of the large rivers, where it lies concealed till it finds an opportunity of seizing its prey, which is generally fish, or some animal.

CROCUS, saffron, in botany, a genus of plants, whose bulbous roots are perennial, but the leaves which are gramineous, with a white line running along the middle, are annual.

There are many varieties of crocus, but that which produces the saffron of the shops has a beautiful purplish flower, which blows in autumn.

Saffron is to be chosen fresh, tough, flexible, difficult to be broken, of a strong smell, and very bitter taste, and such as stains the hands. It is cultivated in fields for use, and is no where raised with so much success as in England; the English saffron being generally allowed to be greatly superior to any other.

Saffron is in many places in great esteem in sauces, and on many occasions in foods; but its great use is in medicine, and indeed with us its sole use. It is a high cordial, and a very powerful aperient, detergent, and resolvent. It is of almost immediate relief against faintings and palpitations of the heart; it also strengthens the stomach, and assists digestion. It is of great use in disorders of the breast arising from the lungs, being loaded with a tough phlegm; and it softens the irritating acrimony of a vitiated serum on those parts, and by this means is often of great use against inveterate coughs: wherefore, it is called *anima pulmonum*. It opens obstructions in the viscera, and particularly in the liver; it cures jaundices, and promotes the menses. It is also anodyne, and occasionally serves as a pargorick; it is very happily joined with opium in the laudanum of Sydenham, and in many other preparations in which that medicine has a principal share.

Yet, notwithstanding all these virtues, saffron improperly administered may do great harm: women with child, and those who have profluvia of the menses are never to meddle with it. It has an ebriating faculty, and when taken in immoderate doses may bring on dreadful head-achs, long sleep, convulsions, and even death. The very smell of it affects the head greatly; its effluvia affect the eyes also, and give them great pain: and we have an account, in Borelli, of a druggist's servant who died by the effect of a large parcel of saffron lying near his bed. Convulsive laughter is no uncommon effect of an immoderate dose of saffron, and there are not wanting instances of people who have died in that state: the very external use of saffron is also to be dreaded on some occasions; the oxycroceum plaister, of which it is an ingredient, must by no means be applied in cases where inflammation is feared; for it often occasions one.

CROCUS, in chymistry, denotes any metal calcined to a red or deep yellow colour: thus we meet with crocus martis aperiens and astringens, or the aperient and astringent crocuses of iron; also with the crocus veneris, or copper calcined to such a reddish powder.

CROISADE, CRUSADE, or CRUZADO, a holy war, or an expedition of the Christians against the Infidels for the recovery of the Holy-land, and so called from those who engaged in it, wearing a cross on their cloaths.

CROSIER, or CROZIER, a shepherd's crook, a symbol of pastoral authority, consisting of a gold or silver staff, crooked at the top, carried occasionally before bishops and abbots, and held in the hand when they give solemn benedictions.

CROSIERS, in astronomy, four stars in the southern hemisphere, in the form of a cross, serving those who sail in south latitude to find the antarctic pole.

CROSS, in heraldry, one of the honourable ordinaries containing one fifth of the field.

This bearing was first bestowed on such as had performed, or at least undertaken some service for Christ, and the Christian profession; Guillim and some others call it the most honourable charge in all heraldry. What brought it into such frequent use was the ancient expeditions into the Holy-land, for the pilgrims, after pil-



their pilgrimages, took the cross for a mark of distinction; and the ensign of that holy war was the cross, whence these expeditions were called *croisades*.

**CROSS Multiplication**, a method of multiplying feet and inches by feet and inches, or the like; so called from the operations being performed crosswise.

**CROSS-STAFF**, a mathematical instrument used to take the sun's altitude.

This instrument consists of a staff and four crosses, viz. the tenth cross, the thirtieth cross, the sixtieth and the ninetieth cross.

The staff is a square piece of wood on which the crosses slide, each side being graduated into divisions: the first side has from about three degrees to ten delineated on it: the second from ten to thirty: the third from twenty to sixty: and the fourth from thirty to ninety.

The tenth cross, so called from its belonging to that side of the staff which is numbered from three to ten degrees, is the shortest of the four crosses, and is to be used when the sun's altitude is under ten degrees. Sometimes the breadth of the thirtieth cross supplies its place.

The thirtieth cross is longer than that of ten, and belongs to that of the cross which is numbered from ten to thirty, whence it has its name: when the sun's altitude is between ten and thirty degrees, this cross is to be used.

The third or sixtieth cross, so termed from belonging to that side of the staff which is numbered from twenty to sixty, is longer than the former, and is to be used when the sun's altitude is between thirty and sixty degrees.

The fourth cross is called the ninetieth cross, because it belongs to that side of the staff which is numbered from thirty to ninety degrees. This cross is used when the sun's altitude is between sixty and ninety degrees.

The several divisions on the staff are constructed after the following manner.

Let AB (*Plate XXVI. fig. 6.*) represent the side of the staff to be divided; with any convenient radius, setting one foot of the compasses in A, with the other describe the semicircle DEC, and draw the diameter DAC, at right angles to AB: divide each quadrant into ninety equal parts or degrees; at the distance of half the length of the cross, draw the lines Ff, Gg, parallel to AB, and from the centre of the circle draw right lines through the several divisions of the quadrants; and, from the intersections of those right lines with the two parallel lines Ff, Gg, draw right lines intersecting the staff AB, which will give the several divisions: thus the line FG, intersecting the staff AB, in the point a, will give the division of twenty degrees, because the angle FAG = twenty degrees: and after the same manner, and by making use of the length of the several crosses, may the four sides of the staff be divided.

*To take the sun's altitude with the cross-staff.*

Having adapted the proper cross to the staff, apply the flat end of the staff at A (*plate XXVI. fig. 7.*) to the outside of the eye, the face being turned towards the sun; look for the object at the upper end of the cross at C, and at the lower end B for the horizon; but, if the sky appear instead of the horizon, slide the cross nearer to the eye; if the sea appear, remove it further from the eye, till the object appear at the end C, and, at the same time, the horizon at the end B; then will the cross cut, on the side of the staff proper to it, the degree and minute of altitude. But, if the meridian altitude be required, the observation must be continued, and as the object approaches the meridian, the sky will appear at the end B instead of the horizon; but, when the object begins to descend, the sea will appear at the end B, and then is the observation finished, and the cross will cut the degrees, &c. of altitude.

**Cross**, in surveying, an instrument consisting of a brass circle, divided into four equal parts, by two lines intersecting each other at the centre; at the extremity of each line there is a sight fixed, standing perpendicularly over the line, with holes below each slit, for the

better discovery of distant objects. This instrument is mounted on a stand, and is but little known, and less used among us, though abroad it is often used in surveying.

**CROSS-BAR-SHOT**, a bullet with an iron-bar passing through it, and standing six or eight inches out at both sides: it is used at sea, for destroying the enemy's rigging.

**CROSS-TREES**, certain pieces of timber laid across the heads of the lower-masts to make a frame for the top to rest on. The use of the top is to extend the shrouds of the top-masts, that they may support it the better.

**CROSSELET**, a little or diminutive cross, used in heraldry, where the shield is frequently seen covered with crosselets: also fesses and other honourable ordinaries, charged or accompanied with crosselets. Crosses frequently terminate in crosselets.

**CROTAPHITES**, in anatomy, a muscle of the lower jaw, serving to draw it upwards.

**CROTCHES**, in naval architecture, certain crooked timbers in the after-hold, forming the narrower parts of a ship, or those near the stern.

**CROTCHET**, in music, one of the notes or characters. See the article **CHARACTER**.

**CROTCHETS**, in printing, are marks for inclosing a word or sentence, distinguished from the rest of the work: they are generally of the following form [ ].

**CROUP**, in medicine, is a disease in the trachea arteria, by no ancient author taken notice of, and little known by the present age. It seems to be of the convulsive, asthmatic kind, and first appeared in the neighbourhood of Wooler, in Northumberland, in the spring of the year 1755. It chiefly attacks children from infancy to 10 or 12 years of age, and generally such as are most robust and healthy.—In the beginning, this disease is commonly taken for a slight cold, being attended with a gentle cough and some difficulty of breathing. These symptoms continue to appear alternately for two or three days, but increase considerably at night, frequently with a sudden starting in the sleep, as if the child was choaked: in the morning these symptoms are more mild, but return in the evening with greater violence than on the preceding day. During this stage of the disease, there is little or no fever, the pulse rather quicker than ordinary, and the child's appetite the same as when in health. About the third or fourth day, the symptoms increase with great violence, the cough and hoarseness (which before were gentle) are now very bad, and attended with a hollow, grunting noise, resembling the barking of a dog. This sound of the cough is peculiar to this disease, and may be easily distinguished from all other coughs, from the beginning of the distemper, which is always accompanied with a squeaking voice and a very difficult respiration. The abdominal and intercostal muscles are strongly agitated with convulsive contractions which seem to terminate in the throat, although the child seldom has any difficulty in deglutition.

The startings are now very frequent and the child is in danger of suffocation, having frequently a vain attempt to expectorate, for nothing comes up but a thin phlegm from the salivary glands. In these strong efforts to spit, I have seen them hawk up a thin membrane like the internal coat of the trachea arteria. Sometimes, upon pressing the throat, the child complains of a little pain. About the fourth, fifth, or sixth, and sometimes the seventh day, cold clammy sweats break out with an aggravation of all the symptoms, which prove mortal, often very unexpectedly, as the child continues sensible to the last moment.—The above period is generally the time this disease continues; yet, in some instances all the symptoms are quicker; and, on the contrary, it will continue for a fortnight or three weeks; but this seldom happens.

The following method of cure I have followed with very good success. In plethoric habits it may be necessary to take away a little blood, especially when the pulse is full. Notwithstanding this disease has an inflammatory appearance, yet neither repeated bleedings nor any other copious evacuations will answer; for it



is well known, that in nervous diseases, spasmodick strictures will often occasion a spurious plethora. And when these strictures are released, the inflammatory symptoms always disappear. I have always endeavoured to procure a free and gentle perspiration; to promote which, the sooner the patient is confined to bed the better, after being put into the warm bath as high as conveniently can be done; and apply to the throat a cataplasin ex theriac venet. camph. et all. after which a solution of ass. foetid. with a small quantity of tart. emet. or the following mixture which often removes the disease itself.

*R* Alii  $\mathfrak{z}$  i acet. distillat.  $\mathfrak{z}$  i aq. font.  $\mathfrak{z}$  viij contunde sensim affundendo aquas et adde mellis  $\mathfrak{z}$  iij coque parum et cola. Of this give two or three table spoonfuls every two or three hours, or oftener. Glysters may be given of a solution of ass. foetid. The breast, sides, and belly should be frequently rubbed with the following liniment, *R* Camphor.  $\mathfrak{z}$  iij ol. dulc.  $\mathfrak{z}$  ij ol. fuccin. laud. liquid. ana  $\mathfrak{z}$  i m. f. embroc. Fomentations ex absynth. valerian. alij et ass. foetid. ought often to be applied to the breast and sides. And the same cataplasins, as mentioned above for the throat, may be applied to the soles of the feet. I have seen surprising effects attend this method, even when the disease has been far advanced. I never found blisters of any service in this disease; nor do I think they have any good effects in spasmodick cases in general, but rather have a tendency to excite them.

**CROUP of a Horse**, the extremity of the veins above the hips.

**CROW**, in mechanicks, a kind of iron lever, having a claw at one end, and a sharp point at the other.

**CROW'S-BILL**, among surgeons, a kind of forceps for extracting bullets, and other extraneous bodies, out of wounds.

**CROW-FEET**, in the military art, are irons with four points, each three or four inches long; so that which way soever they fall, one point will be uppermost.

**CROW-FEET**, in a ship, are a number of small lines, extended from the tops to the stays. Their principal use is to prevent the top-sails from hitching under the tops when they are hoisted.

**CROWN**, a mark of regal dignity worn by kings, emperors, &c.

**CROWN**, in commerce, a general name for coins both foreign and domestick, which are of, or very near, the value of five shillings sterling.

**CROWN**, in architecture, denotes the uppermost member of the cornice.

**CROWN**, in astronomy, a name given to two constellations; the one called Borealis, the other Meridionalis. See the article **CORONA**.

**CROWN**, in geometry, is a plane ring included between two concentrick perimeters, and is generated by the motion of some part of a right line round a centre, the said moving part not being contiguous to the centre.

The area of a crown will be had by multiplying its breadth by the length of the middle periphery.

**CROWN of Colours**, certain coloured rings which, like halos, appear about the body of the sun or moon, but of the colours of the rainbow, and at a less distance than the common halos. They are formed by the rays of light passing through a thin cloud of globules of water or hail, all of the same bigness.

**CROWN-WHEEL of a Watch**, the upper wheel next the balance, which by its motion drives the balance, and in royal pendulums is called the swing-wheel.

**CROWN-WORK**, in fortification, an out-work, having a very large gorge, generally the length of the curtain of the place, and two long sides terminating towards the field in two demi-bastions, each of which is joined by a particular curtain to a whole bastion, which is the head of the work.

**CRUCIBLE**, a chymical vessel made of earth, and tempered and backed as to endure the greatest fire. They are used to melt metals, and to flux minerals, ores, &c.

The figure of a crucible is commonly that of an obtuse conoid, with its base at the top, and obtuse apex

at the bottom; whence this conical figure may be varied, till it comes to the hollow segment of a sphere.

The crucibles most generally used are those of Hesse and Austria.

**CRUCIFIX**, a cross upon which the body of Christ is fastened in effigy, used by the Roman-catholicks to excite in their minds a strong idea of our Saviour's passion.

They esteem it an essential circumstance of the religious worship performed at the altar; and on Good Friday they perform the ceremony of adoring it, which is done in these words, *O crux ave, spes unica; Hail, thou cross, our only hope.* The officiating priest uncovers the crucifix, elevates it with both his hands, and says, *Ecce lignum crucis; Behold the wood of the cross.* The people answer, *in quo salus mundi pependit, on which the Saviour of the world suffered death.* Then the whole congregation bow with great reverence, and devoutly kiss the holy wood.

**CRUCIFIXION**, a capital punishment by nailing the criminal to a cross.

**CRUCIFORM**, in general, something disposed cross-wise; but more especially used by botanists, for flowers consisting of four petals disposed in the form of a cross.

**CRUDE**, an epithet given to something that has not passed the fire, or had a proper degree of coction.

**CRUDITY**, among physicians, is applied to undigested substances in the stomach; to humours in the body which are unconcocted, and not prepared for expulsion; and to the excrements.

**CRUOR**, among anatomists, sometimes signifies the blood in general; sometimes only the venous blood; and sometimes extravasated, or coagulated blood.

**CRUPPER**, in the manege, the buttocks of a horse; the rump; also a thong of leather put under a horse's tail, and drawn by thongs to the buckle behind the saddle, so as to keep him from casting the saddle forwards on his neck.

**CRURIAL**, in anatomy, an epithet given to the artery which conveys the blood to the crura, or legs; and to the vein by which the blood returns from thence towards the heart.

**CRUSTACEOUS**, an epithet applied to animals covered with shells made up of several pieces.

**CRYPTOGAMIA**, a name given by Linnæus to the twenty-fourth class of plants in his system of botany. This class consists of such plants, whose organs of fructification are either concealed within the fruit itself, or so minute, as not to be perceptible to the naked eye. The fructification in these is also of an uncommon structure. To this class belong the ferns, mosses, flags, mushrooms, &c.

**CRYPTOGRAPHY**, the art of writing in cypher, or with sympathetick ink.

**CRYSTAL**, *κρυσταλλος*, in natural history, the name of a very large class of fossils, hard, pellucid, and naturally colourless; of regularly angular figures, composed of simple, not filamentous plates; not flexible nor elastick, giving fire with steel; not fermenting in acid menstrua, and calcining in a strong fire.

**CRYSTALS**, in chymistry, salts or other matters, shot, or congealed in the manner of crystal.

**CRYSTALLI**, among physicians, eruptions about the size of a lupen, white and transparent, which sometimes break out all over the body.

**CRYSTALLINE**, in general, something composed of or resembling crystal.

**CRYSTALLINE HEAVENS**, in ancient astronomy, two spheres, imagined between the primum mobile and the firmament, in the Ptolemaick system, which supposes the heavens solid, and only susceptible of a single motion.

**CRYSTALLINE Humour of the Eye**. See **EYE**.

**CRYSTALLIZATION**, in chymistry, the concretion of a salt, before dissolved in water.

The intentional end of crystallization, is to render the salts pure and distinguishable, as well by freeing them from feculencies, and giving them their proper form, as by separating each kind from every other with which they may happen to be mixed.

The



The manner of performing it is to make a saturate solution of the salts, in boiling water, either by adding the salts, if dry, to the water, or by evaporating the redundant water, if they were before dissolved, and then putting the solution into a proper vessel, and suffering it to stand at rest, in a cool place, till the crystals are formed. This is perfected in a longer or shorter time, according to the degree of heat or cold of the weather. It is nevertheless best, not to be too hasty in taking out the crystals, for there will be some continuance of their increase, for a considerable length of time, and the quantity therefore obtained, by each operation, proportionably greater. When the full quantity of crystals is formed, the remaining solution, called, in this case, the mothers, is to be poured off; and what the crystals retain, must be drained off from them, which may be best done by putting them into an earthen colander, or a sheet of filtering paper.

The crystals being thus taken from their mothers, they may be again evaporated, or dry salts may be added to them, whilst boiling, till a saturation of the hot solution is again produced, and on their being treated as before, a second quantity of crystals will be obtained. By the same method repeated, nearly the whole quantity of salts may be converted into crystals.

This is all that is necessary, when the salts are pure; but if they are mixed with any feculencies, it is requisite that, before the solution is set to shoot, filtration should be used. See the articles *FILTRATION*, and *DEPURATION*.

*CRYSTALLOIDES*, the crystalline tunick of the eye; a fine membrane containing the crystalline humour.

*CRYSTALLOMANCY*, *κρυσταλλομαντεία*, in antiquity, a kind of divination, performed by means of a mirror, wherein the figures of the things required are said to have been represented.

*CUBE*, in geometry, a solid consisting of six equal square sides.

The solidity of any cube is found by multiplying the superficial content of any one of the sides, by the height. Cubes are to one another in the triplicate ratio of their diagonals.

*CUBE-Root*, is the side of one of the squares constituting the cube.

Thus if the solidity of a cube be 64, the side of one of the squares, or cube root, will be 4: because  $4 \times 4 = 16$ , the superficial content of the square, and  $16 \times 4 = 64$ , the solidity of the cube.

For the manner of extracting the cube root out of any number or quantity; see the article *EXTRACTION*.

*CUBEBS*, in the materia medica, a small dried fruit, resembling a grain of pepper, but often somewhat longer, brought into Europe from the island of Java. In aromack warmth and pungency, they are far inferior to pepper.

Cubebs have an aromack, though not very strong smell, are acrid and pungent to the taste, though less so than pepper. They are esteemed good in vertigoes, palsies, and disorders in the stomach, but are rarely given inwardly.

*CUBICK EQUATION*, in algebra, is an equation, whose highest power consists of three dimensions, as  $x^3 = a - b$ . See the article *EQUATION*.

*CUBICK Foot*, implies so much as is contained in a cube whose side is one foot.

*CUBICK Hyperbola*, is a figure expressed by the equation  $xy^2 = a$ , having two asymptotes, and consisting of two hyperbolas, lying in the adjoining angles of the asymptotes, and not in the opposite angles, like the Apollonian hyperbola, being otherwise called by Sir Isaac Newton, in his enumeration linearum tertii ordinis, an hyperbolismus of a parabola; and is the 65th species of these lines, according to him.

*CUBICK Number*, is that number which is produced by multiplying any number by itself, and then again the product by that number; as 27 is a Cubick number, since 3 multiplying 3 produces 9; and again, 3 multiplying 9 produces 27.

The difference of two cube numbers, whose roots differ by unity, is equal to the aggregate of the square

of the root of the greater, double the square of the less, and the less great.

*CUBICK Parabola*, a curve of the second order, having two infinite legs, tending contrary ways.

*CUBIT*, in the mensuration of the ancients, a long measure, equal to the length of a man's arm, from the elbow to the tip of the fingers.

Dr. Arbuthnot makes the English cubit equal to 18 inches; the Roman cubit equal to 1 foot, 5,406 inches; and the cubit of the Scripture equal to 1 foot, 9,88 inches.

*CUBITÆUS*, in anatomy, the name of two muscles; the one called cubitæus externus, being the first of the extensor muscles of the fingers, the other is the cubitæus internus, which ariseth from the internal ex-tubérance of the humerus and upper part of the ulna, and is inserted, by a strong and short tendon, into the fourth of the first order of the carpus.

*CUBITUS*, in anatomy, a bone of the arm, reaching from the elbow to the wrist, otherwise called the ulna. See the article *SKELETON*.

*CUBOIDES*, or *Os CUBOIDES*, in anatomy, the seventh bone of the foot, so called from its resembling a cube. It is situated in the external side of the tarsus, where it receives the outer bone of the metatarsus, and is articulated with the neighbouring bones.

*CUCKOW*, *CUCULUS*, in ornithology, a genus belonging to the order of picæ. The bill is somewhat cylindrical; the edges of the nostrils are a little prominent; the tongue is arrow-shaped, plain, and not divided, and the toes are of the climbing kind, i. e. two before and two behind. It is about the size of a pigeon. The cuckow is a migrating bird; it comes to Britain about the end of April, hatches its young, and disappears about St John's day. The cuckow neither builds a nest, nor sits upon its eggs; but takes possession of a nest built by small birds of the sparrow kind, in which it generally lays but one egg, which is hatched by the small bird along with its own eggs; during the time of hatching, the cuckow sits upon hedges or trees, and almost constantly sings. If the cuckow's egg be first hatched, she immediately throws out and destroys the eggs of the small bird; but if the small bird's eggs be first hatched, the cuckow allows the young to live till its own egg is hatched, and then destroys the young belonging to the small bird. The small bird feeds and brings up the young cuckow with as much care and attention as if it were its own, till it be able to procure its own food, when, some say, it ungratefully kills and eats its nurse. The cuckow feeds upon caterpillars and small birds; but is never transformed into a hawk, as is vulgarly supposed. It is a native of Europe. Linnæus enumerates no less than 22 species, which inhabit different parts of the globe, and are chiefly distinguished by the shape of the tail and variations in colour.

*CUCULARIS Musculus*, in anatomy, a large, broad, thin, fleshy plane, situated between the occiput, and lower part of the back, and thence extending to the shoulder. Its use is to move the scapula, upwards, downwards, or backwards.

*CUCUMBER*, *Cucumis*, in botany, a genus of the monoecia syngenesia class. The calix of the male has five teeth; the corolla is divided into five segments; and the filaments are three: The calix and corolla of the female are the same with those of the male; the pistillum is trifid; and the seeds of the apple are short and slender. There are 11 species, none of them natives of Britain.

The young plants are raised from seeds under a glass on hot dung, and afterwards either pricked out on a bed prepared for that purpose, or into pots, and plunged into the same bed.

Besides the use of cucumbers as a food, their seed is one of the four greater cold seeds of the shops, and is almost an universal ingredient in emulsions, and found of great service in fevers and in nephritick complaints.

*Wild CUCUMBER*, in botany. See *MOMORDICA*.

*CUCURBIT*, in chymistry, an earthen, iron, or glass vessel in the form of a cucurbita, or globe, arising gradually



gradually from a wide bottom, and terminating in a narrow neck.

**Blind CUCURBIT**, a double vessel, consisting of two cucurbits, the neck of the smaller being inserted into that of the larger.

**CUCURBITA**, the **GOURD**, in botany, a genus of the monoecia syngenesia class. The calix has five teeth; the corolla is divided into five segments; and the filaments are three: The calix and corolla of the female are the same with those of the male; the pistillum is quinquesid; and the seeds of the apple are turned at the edges. The species are five, none of them natives of Britain.

**CUD**, sometimes means the inside of the throat in beasts, and sometimes the food that they keep there and chew over again: from whence, to *chew the cud*, signifies, to ponder, think, or ruminate upon a thing.

**CULDEES**, in church history, a sort of monkish priests, formerly inhabiting Scotland and Ireland. Being remarkable for the religious exercises of preaching and praying, they were called, by way of eminence, Cultores Dei; from whence is derived the word Culdees. They made choice of one of their own fraternity to be their spiritual director, who was afterwards called the Scottish bishop.

**CULM**, among botanists, a term used to denote the stalk of grasses, hence called culmiferous plants. See the next article.

**CULMIFEROUS Plants**, in botany, such plants as have a smooth jointed stalk, usually hollow, and at each joint wrapped about with single, narrow, sharp-pointed leaves, and their seeds contained in chaffy husks, as wheat, barley, &c.

**CULMINATION**, in astronomy, is a term applied to any one of the heavenly bodies when it is on the meridian.

**CULPRIT**, a term used by the clerk of the arraignment, when a person is indicted for a criminal matter.

After the indictment has been read in court, which is the crown's charge against the prisoner, he is asked if he is guilty, or not guilty? If he answers, Not guilty, there is next a replication from the crown, by continuing the charge of guilt upon him, according to the tenor of the indictment, which is expressed by pronouncing the word *culprit*; *cul* being an abbreviation of the Latin word *culpa*, guilt, and *prit* (now *pret*) an old French word for ready. This assertion therefore of the clerk of the arraignments signifies, that the prisoner is guilty of the crime charged on him, and that the crown is ready to prove it upon him.

**CULVERIN**, a species of ordnance, of which there are the three following sorts:

**CULVERIN extraordinary**, is five inches and a half in bore, thirteen feet long, and weighs four thousand eight hundred pounds: its charge of powder is about twelve pounds, and it carries a shot of five inches and a quarter in diameter, weighing twenty pounds.

**CULVERIN ordinary**, is twelve feet long, and weighs four thousand five hundred pounds, and carries a ball of seventeen pounds five ounces.

**CULVERIN of the least size**, is five inches in bore, eleven feet long, weighing about four thousand pounds, and carries a shot three inches and a half in diameter, weighing fourteen pounds nine ounces.

**CUMMIN Seed**, *semen cumini*, in pharmacy, a long, slender seed, scarce so thick as the anniseed, but nearly twice its length; its surface is striated with several deep longitudinal furrows, prominent on one side and flattened on the other, and usually is somewhat crooked in drying; of a tough texture, not easily powdered, unctuous when bruised, and of a dusky greenish brown colour. It is of a very strong, but not disagreeable smell, and of an acrid and pungent taste.

Cummin-seed is to be chosen new, large, and clean. Europe is in a great measure supplied with it from the island of Malta, where it is cultivated in fields as corn with us. The plant is one of the pentandria digynia of Linnæus, and of the herbæ umbelliferæ of Mr. Ray. All the botanical writers have described the plant under the name of *cuminum*, and *fœniculum orientale*, or oriental fennel.

Cummin-seed, on a chymical analysis, affords a large quantity of an essential oil, an austere ill-tasted phlegm, containing an acid, and with it an urinous salt. It is a very good carminative and stomachick. It is given with great success in colicks, and often in vertigoes and other diseases of the head, arising from disorders in the stomach. It is used externally in cataplasms and fomentations with great success, wherever a warm discutient is required. Cummin-seed bruised, put into a bag and moistened by sprinkling brandy over it, is frequently applied to the belly in colicks, and that with success. The essential oil, drawn by distillation with water in the alembick, is one of the best carminatives in the materia medica; it is less pleasant indeed than that of anise or caraway, but it is greatly more efficacious. Its dose is two or three drops on sugar, and in this small quantity it seldom fails of giving immediate relief in the most racking pains of the colick. The good women have also a way of dropping it on a piece of warm bread, and applying it externally in uterine complaints. The seed is an ingredient in several shop compositions, intended for external as well as internal use.

**CUNIFORM**, in general, is an epithet applied to bodies in the form of a wedge or cuneus.

**CUNETTE**, or **CUVETTE**, in fortification, a deep trench, about three or four fathom wide, sunk along the middle of a dry moat, either to lade out the water, or render its passage more difficult to the enemy.

**CUNEUS**, the wedge, one of the five mechanical powers. See **WEDGE**.

**CUOLA**, in architecture. See **DOVE**.

**CUPPEL**, **CUPEL**, or **COPEL**, in chymistry, a small vessel made of bone-ashes, &c. used in assaying metals.

**CUPPING**, in surgery, the operation of applying cupping-glasses for the discharge of blood, and other humours by the skin.

The operation of cupping is not confined to any particular member of the body; but wherever the cupping-glass is applied, it is fixed upon the skin, either intire or scarified, and hence we have a two-fold distinction of cupping, into dry and gorey.

In dry cupping, the glass adheres to the skin, by expelling or rarefying its included air by lighted flax, or the flame of a burning candle within it, so that the glass is pressed upon the part with a considerable force, by the external air. The use of this dry-cupping is two-fold, either to make a revulsion of the blood, from some particular parts affected, or else to cause a derivation of it into the affected part, upon which the glass is applied: hence we have a reason why Hippocrates orders a large cupping-glass to be applied under the breasts of a woman who has too profuse a discharge of her menses, intending thereby to make a revulsion of the blood upwards from the uterus. Dry cupping is also used, with success, to make a revulsion, by applying the glasses to the temples, behind the ears, or to the neck and shoulders, for the removal of pains, vertigoes, and other disorders of the head: they are applied to the upper and lower limbs, to derive blood and spirits into them, when they are paralytick; and, lastly, to remove the sciatica, and other pains of the joints. The operation in these cases is to be repeated upon the part, till it looks very red, and becomes painful.

In Germany, and other northern countries, cupping is much oftener joined with scarification, than used alone; in which case the part is first to be cupped, till it swells and looks red, and the skin is to be punctured, or incised, by the scarifying instrument.

As several glasses, sometimes six or eight, are often applied at once, the operator must manage his business so, that some glasses may be filling while he is scarifying, and adapting the others. When the blood ceases to flow fast enough, he must repeat his incisions, close by the former, and re-apply the cupping-glasses. The operation being finished, and the skin well cleansed with a sponge, and warm water, it is next to be rubbed over with a bit of deer's suet, to promote the healing: but if the blood still continues to flow, the skin-



is to be washed with spirit of wine and hungary water, binding it up with a comprefs and bandage.

The cupping-glass and instrument are represented in plate XXVI. fig. 12.

This instrument consists of a brass box, on one of whose sides are a number of lancets moveable by a spring within the box. When this side is applied to the skin, the spring is to be raised by the handle A; and on depressing the button B, it causes the lancets to pierce the skin all at once.

CUPRESSUS, the cypress tree, one of the evergreens, and very proper to mix with pines and firs in forming clumps.

CURIA, in Roman antiquity, a certain division or portion of a tribe. Romulus divided the people into thirty curiæ, or wards, whereof there were ten in every tribe, that each might keep the ceremonies of their feasts and sacrifices in the temple, or holy place, appointed for every curia.

CURNOCK, a measure of corn, containing four bushels, or half a quarter.

CURRAN, or CURRANT, *Ribes*, in botany, a shrub, whose bark is brown; but the extreme shoots are ash-coloured. The leaves are like those of the vine, but much less; of a dark green above, but covered with a soft down beneath. The flowers grow in bunches, and are rosaceous: and the fruit is a well known globular berry.

The white and red sort are mostly used, for the black, and chiefly the leaves, upon first coming out, are in use to flavour English spirits, and counterfeit French brandy. Currans greatly assuage drought, cool and fortify the stomach, and help digestion.

Black currans have a very disagreeable, nauseous taste; however, a jelly is made of them, which is said to be a specifick against the quinsy, if swallowed down leisurely in small quantities: it is also good to cure inflammatory distempers of the throat.

CURRANS, also signify a smaller kind of grapes brought principally from Zant and Cephalonia. They are gathered off the bunches, and laid to dry in the sun, and so put in large butts. They are open and pectoral, but are more used in the kitchen than in medicine.

CURRANT, or COURANT-MONEY, that money which passes in commerce from one to another.

CURRENT, in hydrography, is a stream or flux of water in any direction. Currents in the sea are either natural and general, arising from the diurnal rotation of the earth on its axis; or accidental and particular, caused by the water's being driven against promontories, or into gulphs and streights; where, wanting room to spread, they are driven back, and thus disturb the ordinary flux of the sea.

Dr. Halley makes it highly probable, that in the Downs, &c. there are under currents, whereby as much water is carried out, as is brought in by the upper currents.

CURRENTS, in navigation, are certain settings of the stream, causing all bodies moving therein to alter either their direction or velocity, or both; whereby their motions become compounded of their own velocity and the setting of the current. For,

If a body at A (plate XXVI. fig. 1.) be, at the same time, agitated by two motions, the one with a velocity that will carry it in the direction from A to B, in a given time; the other according to the direction of AD, with a velocity that will carry it to D in the same time; then will the body A move along the diagonal AC, and at the end of the time will arrive at the point C, whence the several following cases may be easily understood.

But before we proceed to the solution of the several cases, it will be necessary that we shew the method of finding the setting and drift of a current, which may be performed in the following manner:

Take your ship's boat with three or four men, a compass, a log-line with a large log to it, and a kettle or iron pot, with a quail or two of inch rope fastened to its bale. When you are at a proper distance from the ship, heave your kettle overboard, and let it sink eighty

or one hundred fathoms, which will ride the boat nearly as fast as if at anchor. Heave your log, and turn your half minute glass, observing at the same time to set the drift of the log by the compass; then will the knots run out during the half minute, give the current's drift or rate of driving, and the compass its setting.

Case 1. Suppose a ship sails S. S. W. fourteen miles in two hours, in a current setting S. S. W. three miles an hour, required the true course and distance sailed?

Because the current's setting is the same with the ship's course, therefore her distance is augmented by as much as is the drift of the current, and, consequently, the ship's true course is S. S. W. and her distance = twenty miles.

Case 2. Suppose a ship sails S. S. W. at the rate of forty miles in five hours, in a current setting N. N. E. two miles an hour; required her true course and distance?

Because the setting of the current is directly opposite to the ship's course, therefore the velocity of the ship is lessened as much as is the current's drift; and because the drift of the current is = ten miles in five hours, therefore the ship's true course will be S. S. W. and her distance = thirty miles.

N. B. If the drift of current exceeds the ship's motion, she will fall a-stern, with a velocity equal to the excess of the motion of the current above that of the ship.

Case 3. Suppose a ship sails N. E. thirty miles, in a current setting E. S. E. twenty miles in the same time; required her course and distance?

Solution:

Having drawn the compass N. E. S. W. (plate XXVI. fig. 3.) let A be the place of the ship; and draw the N. E. line AB = thirty; then will B be the place the ship would have arrived at, if there had been no current. From B draw the line BC parallel to the E. S. E. line AC, making it equal to twenty miles, the current's drift; then will C be the ship's true place, the angle NAC her true course, and AC her true distance.

Case 4. Suppose a ship making her way good within seven points of the wind, is bound to a port lying directly to windward or N. N. E. distant one hundred miles, and a current under foot setting N. by W. forty-five miles in the time the ship sails fifty-five miles; required her true course and distance on each tack to gain her intended port, as also her distance she must sail by the log?

Solution:

Having drawn the compass N. E. S. W. (plate XXVI. fig. 2.) let A be the place sailed from; draw the N. N. E. line AB equal to one hundred miles, then will B represent the port the ship is bound to. Draw the lines AG, Ag, at seven points distant from the wind-line AB, and make each = fifty-five miles, the distance sailed by the log during the experiment; through G and g draw the lines GD, gd, parallel to the W. by N. line Am, the setting of the current, making each = forty-five miles, the drift of the current during the experiment, and draw the lines AD and Ad; then will D or d, according as she sailed upon the larboard or starboard tack, be the true place of the ship at the end of the experiment, or while she sails fifty-five miles by the log. From B draw the lines BC and Bo, the former parallel, to Ad, and the latter parallel to AC, continuing them till they meet the lines AC and Ad in C and o.

The problem being thus constructed, the several requisites may be measured by the lines of chords and equal parts. For if the ship sails first on the larboard tack, continuing her course till she has sailed by the log the distance AH, then will her true place be C, her true course the angle NAC, and her true distance AC: then getting her starboard tacks on board, and standing to the westward, when she has sailed by the log the distance Cn = Ab, she will arrive at her intended port; for then her true place will be B, her true course the angle NAc, and her true distance BC = Ao. But if she first sail on the starboard tack, then must she sail by the log the distance Ah, whereby her true place will be o; then getting her larboard tacks on board, and standing to the eastward, till she has sailed by the log the distance op = AH, she will arrive at her intended port;

Y y y

for



for then her true place will be B, and her true distance  $B=AC$ .

**CURRIERS**, those who dress and colour leather after it is properly tanned.

**CURRYING**, the method of preparing leather after it is tanned, with oil, tallow, &c. in order to soften it and render it supple.

**CURSITOR**, a clerk belong to the court of chancery, whose business it is to make out original writs.

**CURSOR**, in mathematical instruments, a small piece of brass, made to slide or move, as occasion may require.

Thus the piece of brass, in an equinoctial ring-dial that slides to the day of the month; the label of brass divided like a line of lines, and sliding in a groove along the middle of another label, representing the horizon in the analemma; and likewise a brass point screwed on the beam-compasses, which may be moved along the beam for the striking of greater or less circles, are all called by this name.

**CURTAILING**, in farriery, is the docking or cutting off a horse's tail.

**CURTAIL-DOUBLE**, a musical wind instrument, like the bassoon, which plays the bass to the hautboy.

**CURTAIN**, or **CURTIN**, in fortification. See the article **CURTIN**.

**CURTATE DISTANCE**, in astronomy, the distance between the sun and that point where a perpendicular, let fall from a planet, meets the ecliptick.

**CURTATION**, in astronomy, is the difference between the distance of a planet in its orbit from the sun, and its distance from him when referred to the ecliptick, which is always less in the latter case than in the former.

**CURTEYN**, *Curtana*, in the British customs, king Edward the confessor's sword, borne before the prince at coronations; its point is said to be broken off, as an emblem of mercy.

**CURTIN**, **CURTAIN**, or **COURTIN**, in fortification, is that part of the rampart of a place which is betwixt the flanks of two bastions, bordered with a parapet five feet high, behind which the soldiers stand to fire upon the covert way and into the moat. As it is the best defended of any part of the rampart, besiegers never carry on their attacks against the curtain, but against the faces of the bastions, because of their being defended only by one flank. See the article **FLANK**.

*Angle of the CURTIN*, that contained between the curtain and the flank.

**CURVATURE of a Line**, is the peculiar manner of bending or flexure by which it becomes a curve of such peculiar properties.

**CURVE**, in geometry, a line which running on continually in all directions, may be cut by one right line in more points than one.

Curves are divided into algebraical or geometrical, and transcendental.

Geometrical or algebraical curves are those whose ordinates and abscissas being right lines, the nature thereof can be expressed by a finite equation having those ordinates and abscissas in it.

Transcendental curve is such as when expressed by an equation, one of the terms thereof is a variable quantity.

Geometrical lines or curves are divided into orders, according to the number of dimensions of the equation expressing the relation between the ordinates and abscissas, or according to the number of points, by which they may be cut by a right line.

And a curve of the first kind (for a right line is not to be reckoned among curves) is the same with a line of the second order; and a curve of the second order, the same as a line of the third; and a line of an infinite order, is that which a right-line can cut in an infinite number of points, such as a spiral, quadratrix, cycloid, the figures of the lines, tangents, secants, and every line which is generated by the infinite revolutions of a circle or wheel.

For the various curves of the first order and their properties, see the articles **CONIC-SECTIONS**, **PARABOLA**, **HYPERBOLA**, **ELLIPSIS**, &c.

As to the curves of the second order, Sir Isaac New-

ton observes they have parts and properties similar to those of the first: thus as the conic sections have diameters and axes, the lines cut by these are called ordinates, and the intersection of the curve and diameter, the vertex; so in curves of the second order, any two parallel lines being drawn so as to meet the curve in three points, a right-line cutting these parallels so as that the sum of the two parts between the secant and the curve on the one side, is equal to the third part terminated by the curve on the other side, will cut in the same manner all other right-lines parallel to these, and meet the curve in three parts, so as that the sum of the two parts on one side will be still equal to the third part on the other side.

These three parts, therefore, thus equal, may be called ordinates or applicates: the secant may be styled the diameter; the intersection of the diameter and the curve, the vertex; and the point of concurrence of any two diameters, the centre. And if the diameter be normal to the ordinates, it may be called axis; and that point where all the diameters terminate, the general centre. For the other properties of curves of the second order, we refer the reader to Mr. Maclaurin's treatise *De linearum geometricarum proprietatibus generalibus*.

Sir Isaac Newton reduces all curves of the second order to the four following particular equations, still expressing them all. In the first, the relation between the ordinate and the abscissa, making the abscissa  $x$  and the ordinate  $y$ , assumes this form  $xy^2 + ey = ax^3 + bx^2 + cx + d$ . In the second case, the equation takes this form  $xy = ax^3 + bx^2 + cx + d$ . In the third case, the equation is  $y^2 = ax^3 + bx^2 + cx + d$ . And in the fourth case, the equation is of this form  $y = ax^3 + bx^2 + cx + d$ . Under these four cases, the same author enumerates seventy-two different forms of curves, to which he gives different names, as ambigenal, cuspidated, nodated, &c.

Of these seventy-two curves, nine are redundant hyperbolas without diameters, having three asymptotes including a triangle; twelve are redundant hyperbolas with only one diameter; two are redundant hyperbolas with three diameters; nine are redundant hyperbolas with three asymptotes, converging to a common point; six are deficient hyperbolas having no diameters; seven are defective hyperbolas having a diameter; seven are parabolick hyperbolas having no diameter; four are parabolick hyperbolas which have a diameter; four are hyperbolisms of the hyperbola; three are hyperbolisms of the ellipse; two are hyperbolisms of the parabola; one a trident; five are diverging parabolas; and one a cubical parabola.

Besides these, Mr. Stirling found out four more species of redundant hyperbolas; and Mr. Stone, two deficient hyperbolas.

*Genesis of CURVES of the second Order by Shadows.* If (says Sir Isaac Newton) upon an infinite plane illuminated from a lucid point the shadows of figures be projected, the shadows of the conic sections will be always conic sections: those of the curves of the second kind will be always curves of the second kind; those of the curves of the third kind will be always curves of the third kind, and so on *in infinitum*. And as a circle by projecting its shadow generates all the conic sections, so the five diverging parabolas by their shadows, will generate and exhibit all the rest of the curves of the second kind; and so some of the most simple curves of the other kinds may be found, which will form by their shadows upon a plane, projected from a lucid point, all the rest of the curves of that same kind.

*Family of CURVES*, a congeries of several curves, defined by the same equation of an indeterminate degree; but differing according to the diversity of their kinds.

**CURVILINEAR**, or **CURVILINEAL Figures**, in geometry, are those which are limited or bounded by curve lines.

**CURULE Chair**, in antiquity, is a chair adorned with ivory, wherein the great magistrates of Rome had a right to sit, and be carried.

The curule magistrates were the ædiles, prætors, consuls and censors. The chair was fitted into a kind of chariot (*currus*); whence the origin of the word *curulis*.

CUR,



**CUSP**, in astronomy, a term used to express the points or horns of the moon, or other luminary.

**Cusp**, in astrology, is used to signify the first point of each of the twelve houses, in a scheme of the heavens.

**CUSPIDATED**, in botany, is an epithet applied to such flowers whose leaves terminate in a cusp or point, resembling that of a spear.

**CUSTODE** *admittendo*, and **CUSTODE** *amovendo*, are writs for the admitting or removing of guardians:

**CUSTOM**, a very comprehensive term, denoting the manners, ceremonies, and fashions of a people, which having turned into a habit, and passed into use, obtains the force of laws; in which sense it implies such usages as, though voluntary at first, are yet, by practice, become necessary.

Custom is hence, both by lawyers and civilians, defined *lex non scripta*, a law, or right, not written, established by long usage, and the consent of our ancestors: in which sense it stands opposed to the *lex scripta*, or the written law.

**Custom of Merchants**—If a merchant gives a character of a stranger to one who sells him goods, he may be obliged to satisfy the debt of the stranger for the goods sold, by the custom of merchants.

**CUSTOMS**, in commerce, the tribute or toll paid by merchants to the king, for goods exported or imported: they are otherwise called duties.

**CUSTOM-HOUSE**, an office established by the king's authority in maritime cities, or port towns, for the receipt and management of the customs and duties of importation and exportation, imposed on merchandises, and regulated by books of rates.

**CUSTOM-OFFICERS** shall not have any ships of their own, nor may they use merchandise, factorage, nor keep a tavern, &c.

**CUSTOS**, in musick, the same with *mostra* or *index*.

**CUSTOS BREVIIUM**, the principal clerk belonging to the court of Common Pleas, whose business it is to receive and keep all the writs made returnable in that court, filing every return by itself: and at the end of each term, to receive of the prothonotaries all the records of the Nisi Prius, called the posteas.

**CUSTOS ROTULORUM**, an officer who has the custody of the rolls and records of the sessions of peace, and also of the commission of the peace itself.

**CUTANEOUS**, an epithet applied to whatever relates to the cutis or skin.

**CUTICULA**, or **CUTICLE**, in anatomy, a thin membrane, lying closely upon the skin, of which it seems a part, and to which it closely adheres.

**CUTICULAR**, the same with Cutaneous. See the article **CUTANEOUS**.

**CUTIS**, the skin, in anatomy, a strong thick membrane, investing the whole body.

This membrane has a double connection, its upper surface adhering to the corpus reticulare and the cuticle, and its under surface to the fat. In some places this connection is but lax, in others it is very firm. The thickness of the cutis is very different in several parts of the body, and as different in the skins of different animals, as appears from the leather made from it, for common purposes. It has a multitude of sulci, or lines, which are common to it with the cuticle. It has foramina of two kinds in it; the larger, such as those of the mouth, nose, ears, and the like, though in effect the cutis may rather be said to be reflected than perforated in those parts; and the smaller, called pores: and these again are of different sizes, some larger, some smaller, and serve to give passage to the hairs, to the transpiration, and to the sweat. The pores are very large in the nose, where the naked eye may see them. As to the substance and structure of the cutis, it is composed of a multitude of tendinous fibres, single, tenacious, and interwoven in a surprising manner; of a vast number of blood-vessels, and of a great number of nerves, which constitute the pyramidal papillæ, and raise themselves through the pores of the corpus reticulare: these, when the cuticle is taken off, are very easily distinguishable in the palms of the hands and under the soles of the feet, and also at the ends of the fingers, where they

constitute the primary organ of feeling. There are also the cutaneous miliary glands, serving for the excretion of the matters of perspiration. Finally may be remarked the folliculi, or the receptacula cutanea, supposed, by Heister, to be the same as are described by other anatomists under the name of sebaceous glands.

The uses of the skin are numerous: 1. To surround, cover and defend the parts that lie underneath it. 2. To be the organ of feeling. 3. To be an universal emunctory to the body, cleansing the blood of its redundancies, by the means of sweat and perspiration; while these, at the same time, serve to prevent the aridity or dryness of the cutis itself.

**CUTTER**, in naval affairs, a small vessel used principally in the English channel.

Cutters have commonly one mast, and are rigged as sloops: some of these are smugglers, and some vessels in the king's service employed to catch the smugglers.

**CUTTING**, in heraldry, is used for the dividing a shield into two equal parts, from right to left, parallel to the horizon, or in the fesse-way.

**CUTTING**, in painting, the laying one strong lively colour over another, without any shade or softening. The cutting of colours hath always a disagreeable effect.

**CUTTING**, in surgery, the operation of extracting the stone out of the human by section.

**CUTTING**, in *Wood*, a particular kind of sculpture or engraving, denominated from the matter whereon it is employed.

The art of cutting in wood was certainly carried to a very great height about one hundred and sixty years ago: at present it is very low in esteem, as having been long neglected, and the application of artists wholly employed on copper, as the most easy and promising province.

**CUTTINGS**, in gardening, are branches of trees, shrubs, &c. cut off in order for their striking root, and becoming new plants: numbers of plants are raised by cuttings: Those which are deciduous and hardy, the autumn is best for this operation; but evergreen cuttings should be planted in the spring.

In providing cuttings, it is not amiss to leave a knob of the former year's wood on, particularly of those plants which grow freely. With very tender and herbaceous plants, the young branches should be cut just below the joint, and may be stuck in a pot or border, and covered air-tight with a glass; this method will greatly promote their taking root, and is done in the summer months. With some sorts it is necessary to plunge them in a moderate heat to facilitate their rooting; and it may be remarked, that the young shoots of the latest growth are most proper for the operation.

**CUT-WATER**, in ship-building, the fore part of the prow, or that which divides the fluid.

**CYCLE**, in chronology, a certain period, or series of years, months, days, &c. which when it has run regularly from the first to the last, returns again to the first, and thus circulates perpetually.

**Cycle of the Sun**, is a revolution of twenty-eight years, which contain all the possible combinations of the dominical letters in respect to their successive order, as pointing out the common years and bissextiles; so that after the expiration of the cycle, the days of the month return in the same order to the same days of the week throughout the next cycle, except that upon every centesimal year which is not a leap-year, the letters must always be removed one place forward, to make them answer to the years of the cycle; for instance, if the year 1800 were a leap-year, as every centesimal year is in the Julian account, the dominical letters would be E D, and C would be the dominical letter of the next year: but as it is a common year in the Gregorian account, D is the dominical letter of 1801, which answers to the eighteenth of the cycle, C to the nineteenth, &c. until the next centesimal year.

To find the year of this cycle for any year of the christian æra; add 9 to the current year of Christ, because the cycle commenced nine years before the christian æra, and divide the sum by 28, the quotient will shew the number of cycles which have revolved since the beginning of that in which the christian æra commenced;



menced; and the remainder, if any, shews the current year of the cycle: but if there be no remainder, it shews that it is the last, or twenty-eighth year of the cycle.

**CYCLE of the Moon**, called also the golden number, and the Metonick cycle, from its inventor Meton, the Athenian, is a period of 19 years, which when they are completed, the new moons and full moons return on the same days of the month, so that on whatever days the new and full moons fall this year, 19 years hence they will happen on the very same days of the month, though not at the same hour, as Meton and the fathers of the primitive church thought; and therefore, at the time of the council of Nice, when the method of finding the time for observing the feast of Easter was established, the numbers of the lunar cycle were inserted in the calendar, which, upon the account of their excellent use, were set in golden letters, and the year of the cycle called the golden number of that year, which how to find, take the following rule:

Add one to the year of our Lord, and divide by 19, the remainder is the current year of this cycle, or golden number; but if nothing remain, it shews that it is the last year of the cycle, and, consequently, the golden number is 19.

**CYCLE of the Roman Indiction**, is a period of fifteen years, in use among the Romans, commencing from the third year before Christ. This cycle has no connection with the celestial motions; but was instituted, according to Baronius, by Constantine, who having reduced the time which the Romans were obliged to serve to fifteen years, he was consequently obliged, every fifteen years, to impose, or *indicere*, according to the Latin expression, an extraordinary tax for the payment of those who were discharged; and hence arose this cycle.

To find the cycle of indiction for any given year, add 3 to the given year, and divide the sum by 15, the remainder is the current year of the cycle of indiction; if there be no remainder, it is the fifteenth or last year of the indiction.

These three cycles multiplied into one another, that is,  $28 \times 19 \times 15$ , amount to 7980, which is called the Julian period, after which the three foregoing cycles will begin again together. This period had its imaginary beginning 710 years before the creation, according to the common opinion among chronologers concerning the age of the world, and is not yet complete. It is much used in chronological tables. See **EPOCH** and **PERIOD**.

**CYCLOID**, in geometry, a curve generated in the following manner:

If a circle *ABC* (*plate XXVI. fig. 4.*) resting on a right-line *AL*, begin to revolve in the manner of a wheel, from *A* towards *L* the point *A* will, by its twofold motion, describe the curve *ACDIL*, while the circle makes one revolution from *A* to *L*.

This curve is called the cycloid, and from its formation it is evident, (1.) That the base of the cycloid *AL* is equal to the periphery of the generating circle *ABC*. (2.) That the axis of the cycloid *FD* is equal to the diameter of the said circle. (3.) That the part of the base *KL* is equal to the arch of the circle *IK*. (4.) Therefore *KF* (= *ME* = *IG*) is equal to the remaining arch *IH*, or *GD*. (5.) That the chord of the circle *KI* is perpendicular to the cycloid in the point *I*; and (6.) therefore the chord *HI* (being at right-angles with *IK*) is a tangent to the curve in the point *I*. (7.) The said tangent *HI* is parallel to the chord *DG*.

Parallel to *EI* draw *ei* indefinitely near and *In* perpendicular thereto; then will the triangles *DGE*, *DGF*, *Ini*, be similar; and so we have *DE:DG::DG:DF::In:Ii*; consequently, the semicycloid *DIL* =  $2DF$ , the diameter of the generating circle.

Let *AID* (*fig. 5.*) be a semicycloid inverted; and suppose a flexible string fastened at one end in *A*, and stretched along the said curve *AID*, so that the other end of the string should be made to coincide with the point *D*; whence the length of the string will be equal to that of the curve: if now the end of the string be taken from *D*, and with a tight hand be drawn from the cycloid, it will, in its evolution, describe the curve

*DBC*: and this curve *CBD*, having the same properties with *AID*, is every way equal and similar to it.

**CYCLOIDAL SPACE**, in geometry, is the space contained between the curve and subtense of the figure equal to thrice that of the generating circle.

**CYDER**, or **CIDER**, an excellent drink made of the juice of apples, especially the more curious table-kinds; the juice of these being esteemed more cordial and pleasant than that of the wild and harsh kinds, growing plentifully in the counties of Hereford, Worcester, Gloucester, &c. However, mixture of fruits is a great advantage to this liquor; the meanest apples mingled together making as good cyder as the best kinds alone: but the best mixture of all, according to Mr. Worlidge, is that of red-streaks with golden-ennets, observing always that they be of equal ripeness. It conduces greatly to the goodness of the cyder, to let the apples lie a week or two in heaps, before they are pressed; in doing which every man may be freely left to the customs of his own native country: but a due management of the expressed juice is of the utmost importance. After straining the liquor through a sieve, let it stand a day or two in an open tun, covered only with a cloth, or boards, to keep out the dust, that the more gross parts may subside. Then draw it off in pails into the vessels, wherein it is intended to be kept, observing to leave an eighth part of them empty. Set these vessels in your coldest cellars, with the bung open, or covered only with a loose cover, both that the volatile steams may have free vent, and that they may be kept cool, otherwise it is apt to ferment too much. Having fermented in this manner for fifteen or twenty days, the vessel may be stopped up close; and, in two or three months time, the cyder will be fit for drinking. But if you expect cyder in perfection, so as to flower in the glass, it must be glued, as they call it, and drawn off into bottles, after it has been a short time in the cask: this is done by pouring into each vessel a pint of the infusion of sixty or seventy grains of the most transparent isinglass, or fish-glue, imported from Archangel, in a little white-wine and river, or rain-water, stirred well together, after being strained through a linen cloth. When this viscous substance is put into the cask, it spreads itself over the surface like a net, and carries all the dregs to the bottom with it.

Ginger added to cyder, not only corrects its windiness, but makes it more brisk; and a few drops of currant-juice, besides tinging, adds a pleasant quickness to it. Honey, or sugar, mixed with some spices, and added to flat cyder, will very much revive it.

Some commend boiling of cyder-juice, which should be done as soon as it is pressed, scumming it continually, and observing to let it boil no longer than till it acquires the colour of small beer: when cold, put it into a cask, leaving a small vent; and when it begins to bubble up out of the vent, bottle it for use.

**CYDONIA**, the quince-tree. See **QUINCE-TREE**.

**CYGNUS**, the swan, in ornithology, a well known large and beautiful bird, of a delicate white colour.

**CYGNUS**, in astronomy, a constellation of the northern hemisphere, consisting, in Ptolemy's catalogue, of 17 stars; in Tycho's, of 19; and in the Britannick, 107.

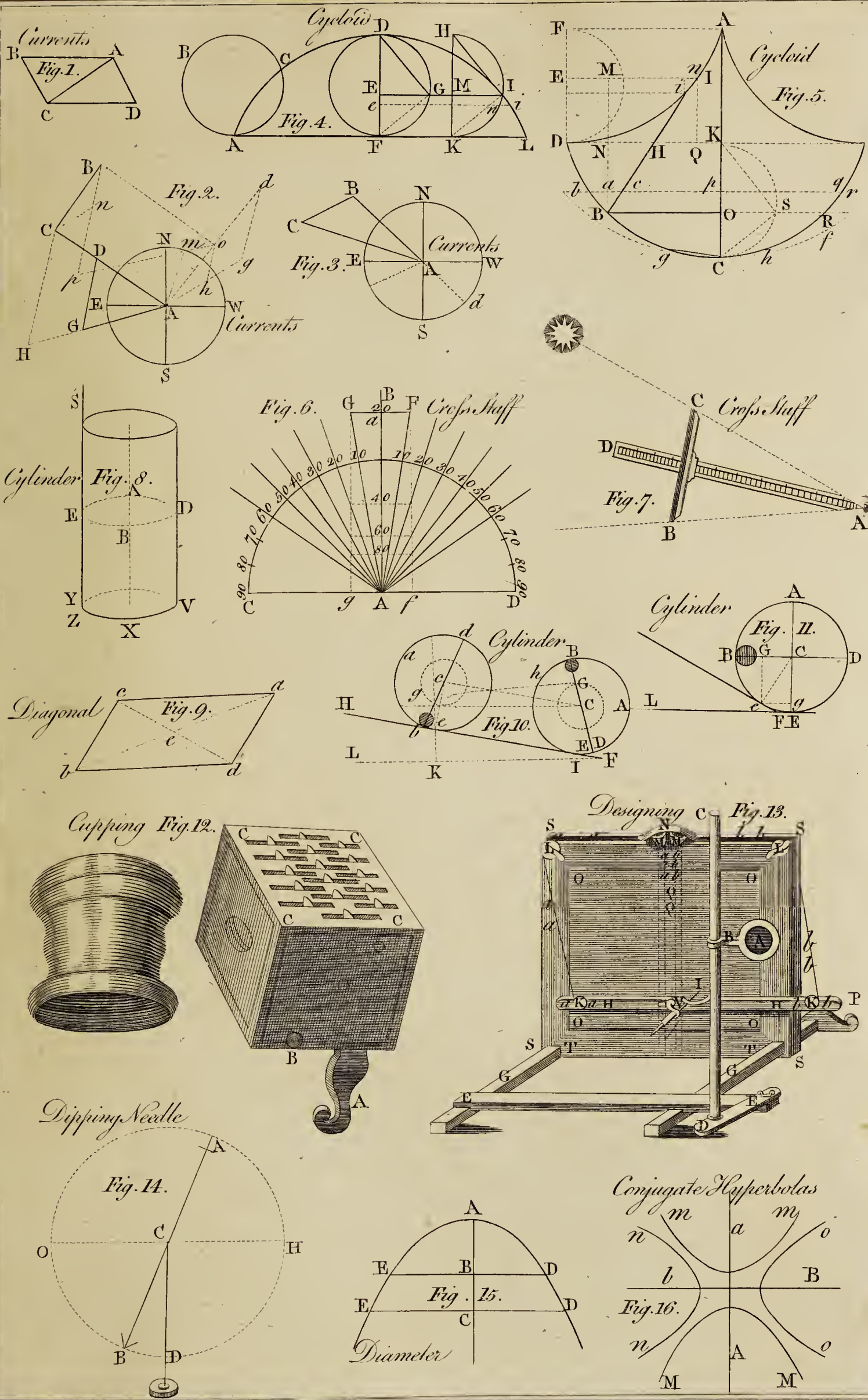
**CYLINDER**, in geometry, a solid, supposed to be generated either by the revolution of a parallelogram about one of its sides, or in the following manner:

If any indefinite right-line *SZ* (*plate XXVI fig. 8.*) being without the plane of the circle *VXY*, move about the circumference of that circle always parallel to itself, until it be returned to the same place from whence it went; then the indefinite solid contained under the base or circle *VXY*, and the superficies generated after this manner by the right-line *SZ*, is called a cylinder, and the said superficies is called the superficies of it; and if the line *SZ* be perpendicular to the plane of the base, the cylinder is called a right one; but if not, an oblique or scalene one.

**Properties of the CYLINDER**: 1. The section of every cylinder by a plane oblique to its base, is an ellipsis. 2. The superficies of a right cylinder is equal to the periphery of the base multiplied into the length of its side.

3. The











3. The solidity of a cylinder is equal to the area of its base, multiplied into its altitude. 4. Cylinders of the same base, and standing between the same parallels are equal. 5. Every cylinder is to a spheroid inscribed in it, as 3 to 2. 6. If the altitudes of two right cylinders be equal to the diameters of their bases, those cylinders are to one another as the cube of the diameters of their bases.

*Rolling* CYLINDER, in philosophy, implies a cylinder that rolls upon an inclined plane.

The phenomenon of the rolling cylinder may easily be accounted for from what has been already observed under the article *CENTRE of Gravity*.

For let *ABED* (*plate XXVI. fig. 11.*) represent a section of a cylinder of wood biased on one side with a cylindrick piece of lead as *B*; this will bring the centre of gravity out of the centre of magnitude *C* to some point *G* between *C* and *B*. Let *FH* be an inclined plane, whose base is *FL*. It is evident the cylinder laid upon the plane will no where rest but there, where a perpendicular to the horizon *FL* passes through the centre of gravity *G*, and that point of the plane *E* in which the cylinder touches it; and this in all angles of inclination of the plane less than that whose sign is equal to *CG*, the radius being *CD*, will be in two situations *ABED* and *abed. fig. 10.* because, when the cylinder moves, the centre of gravity describing a circle round the centre of magnitude *C*, this circle will meet the perpendicular in two points *G* and *g*, in each of which the centre of gravity being supported, the cylinder will rest: therefore the cylinder moves from *E* to *e* by the descent of the centre of gravity from *G* to *g*, in the arch of the cycloid *G g h*.

If the cylinder *ABED* (*fig. 10.*) insinuating on the horizontal line *EL* in the point *E*, has the centre of gravity *G* in the horizontal diameter *DB*, it will gravitate in the perpendicular *G e*; if therefore a plane *FH* touch the cylinder in the point *e*, it is plain the cylinder cannot either ascend or descend on such a plane; because *G*, in any situation between *e* and *H* or *e* and *F*, will gravitate to the left or right from the point in which the cylinder touches the plane; and so will in either case bring it back to the point *e*.

CYLINDRICAL, something in the form of, or resembling a cylinder.

CYLINDROID, a figure resembling a cylinder, except in having elliptical instead of circular bases, or a solid formed by a right line about the periphery of an ellipsis. The solid content of a cylindroid is found by multiplying the area of one of its elliptical bases, by the altitude of the figure.

CYMA, in botany, the tender stalk which herbs send forth early in the spring, especially those of the cabbage kind.

CYMATIUM, in architecture, a member or moulding of the cornice, the profile of which is waved, or concave at the top, and convex at the bottom.

CYMBAL, a musical instrument, much used among the ancients, resembling our kettle-drum, but of a much smaller size, and of different use.

CYNARA, artichoke, in botany. See *ARTICHOKE*.

CYNICKS, a sect of ancient philosophers, who valued themselves upon their contempt of riches and state, art and sciences, and every thing, in short, except virtue or morality.

The cynick philosophers owe their origin and institution to Antisthenes of Athens, a disciple of Socrates, who, being asked of what use his philosophy had been to him, replied, "It enables me to live with myself." Diogenes was the most famous of his disciples, in whose life the system of this philosophy appears in its

greatest perfection: he led a most wretched life, a tub having served him for a lodging, which he rolled before him where ever he went; yet he was, nevertheless, not the more humble on account of his ragged cloak, bag, and tub; for, one day, entering Plato's house, at a time that there was a splendid entertainment there for several persons of distinction, he jumped up upon a very rich couch, in all his dirt, saying, "I trample on the pride of Plato." "Yes (replied Plato,) but with greater pride, Diogenes." He had the utmost contempt for all the human race; for he walked the streets of Athens, at noon-day, with a lighted lantern in his hand, telling the people, "He was in search of a man." Amongst many excellent maxims of morality, he held some very pernicious opinions; for he used to say, that the uninterrupted good fortune of Harpalus, who generally passed for a thief and a robber, was a testimony against the gods. He regarded chastity and modesty as weaknesses; hence Laertius observes of him, that he did every thing openly, whether it belonged to Ceres or Venus, though he adds that Diogenes only ran to an excess of impudence to put others out of conceit with it: but impudence was the characteristick of these philosophers, who argued, that what was right to be done, might be done at all times, and in all places. The chief principle of this sect, in common with the stoicks, was, that we should follow nature; but they differed from the stoicks in their explanation of that maxim, the cynicks being of opinion that a man followed nature, that gratified his natural motions and appetites; while the stoicks understood right reason, by the word nature.

CYNOSURA, a name given by the Greeks to the constellation *Urfa Minor*. See *URSA*.

CYPRESS, *Cupressus*, in botany, the name of a genus of trees very common in the southern parts of Europe, and often planted with us for their beautiful pyramidal form.

The timber of this tree is said to resist the worm, moth, and all putrefaction, and is said to last many hundred years. The doors of St. Peter's church at Rome were framed of this material, which lasted from Constantine the Great to pope Eugenius the Fourth's time, which was eleven hundred years, and were then found and entire, when the pope would needs change them for gates of brass. The coffins were made of this timber, in which, Thucydides tells us, the Athenians used to bury their heroes; and the mummy-chests, brought with those condited bodies out of Egypt, are many of them of this wood.

CYRENIACKS, a sect of ancient philosophers founded by Aristippus of Cyrene, a disciple of Socrates.

They held that the supreme good of man consisted in an assemblage of all mental and sensual pleasures.

CYST, among surgeons, implies the bag or tunick in which all the matter of incysted tumours is inclosed.

CYSTICK, in anatomy, an epithet applied to two arteries opening into the gall-bladder.

CYSTICK DUCT, in anatomy, a tube or canal extending from the gall-bladder through the liver to the bladder.

CZAR, a title of honour assumed by the great dukes, or, as they are now stiled, emperors of Russia.

Beckman makes no doubt but they took this title, by corruption, from *cæsar*, emperor; and accordingly they bear an eagle, as the symbol of their empire, and the word *CÆSAR* in their arms: yet they make a distinction between czar and *cæsar*, the first being taken for the king's name, and the other for the emperor's.

The first that bore this title was Basil, the son of Basilides, under whom the Russian power began to appear, about 1470.



# D.

## D A M

**D**, One of the letters of the alphabet, the fourth in order, and the third consonant, answering to the Hebrew daleth, and Greek delta.

As a numeral, D denotes 500; and with a dash over it, thus,  $\overline{D}$ , 5000. Used in abbreviation, it has various significations: thus, D. stands for doctor, as M. D. doctor of medicine; D. T. doctor of theology; D. D. signifies doctor of divinity, or dono dedit; D. D. D. is used for dat, dicat, dedicat; and D. D. D. D. for dignum deo donum dedit.

Among musicians D signifies, in thorough basses, what the Italians call descanto, and intimates that the treble ought to play alone, as T does the tenor, and B does the bass.

D. C. in the Italian musick, an abbreviation of da capo, that is, from the head, or beginning.

Among Roman writers D stands for *divus*, *decimus*, *devotus*, *diebus* and *diutius*.

DACTYL, *daetylus*, in ancient poetry, a metrical foot, consisting of one long and two short syllables.

DACTYLI, dates, the fruit of one of the species of palm-tree. See the article DATE.

DACTYLICK VERSES, in ancient poetry, were hexameters ending with a dactyl.

DADO, in architecture, the same with dye. See DYE.

DÆMON, a name given by the ancients to certain spirits or genii, which they asserted appeared to men, in order to assist or injure them.

DÆMONIACKS, persons supposed to be possessed with evil spirits, or dæmons.

DAFFODIL, in botany. See NARCISSUS.

DAIRY, among farmers, implies a room or apartment where milk is kept, and manufactured into butter, cheese, &c.

DAISY, *Bellis*, in botany, a genus of the syngenesia polygamia superflua class. The receptacle of the bellis is naked and conical; it has no pappus; the calix is hemispherical, with squamæ of an equal size; and the seeds are oval. There are two species; viz. the hortensis, a native of several parts of Europe; and the perennis, or common daisy, a native of Britain. The leaves of the perennis have a subacid taste, and are recommended as vulneraries, and in asthmas and hectic fevers.

DAM, or DYKE. See the article DYKE.

DAMAGE, in law, is generally understood of an injury or hindrance attending a person's estate; but in common-law, it is a part of the juror's inquiry, in giving their verdict either for the plaintiff or defendant, in a civil action, whether it be real or personal.

DAMARAS, one of the sorts of Indian taffety.

DAMASCUS STEEL, a very fine species of steel made at Damascus, and other parts of the Levant, and remarkable for its excellent temper.

Some writers tell us that it is brought from the kingdom of Golconda, in the E. Indies, where the method of tempering with alum was first invented, and which the Europeans have never been able to imitate.

DAMASK, a silk stuff with a raised pattern.

DAMASKEENING, the art of adorning iron, steel, &c. by making incisions therein, and filling them up with gold or silver wire.

It is chiefly used in enriching sword blades, guards and gripes, locks or pistols, &c. Its name shews the place of its origin, or at least the place where it has been practised in the greatest perfection, viz. the city of Damascus in Syria. Mons. Felibien attributes the perfecting of this art to his countryman Curfinct, who lived in the reign of king Henry IV.

DAMNATA TERRA, in chymistry, the same with caput mortuum. See CAPUT MORTUUM.

## D A T

DAMPS, in natural history, are noxious exhalations, frequently found in mines, pits, wells, and other subterraneous places.

DANCETTE, in heraldry, is when the top line of any bordure or ordinary is largely indented, it being only distinguished from indenting by the largeness of the indentures.

DANDELION, *Leontidon*, in botany, a plant whose flowers are compound and imbricated. This plant grows naturally in fields; and is a very troublesome weed in gardens.

In medicine, it is accounted an aperient and hepatick: and Boerhaave is of opinion, that when it is used for a considerable time, it will dissolve almost all kinds of coagulations, and open the most obstinate obstructions of the viscera. When this plant is young, it is by many people eaten as a salad, and particularly among the French.

DANEGELT, a tax or tribute, on every hide of land, imposed on our ancestors the Saxons by the Danes, on their frequent invasions, as the arbitrary terms of peace and departure. It was at first an annual tax upon the whole nation; was levied by William I. and II. but was released by Henry I. and finally abolished by king Stephen.

DARAPTI, in logick, one of the modes of syllogisms of the third figure, whose premises are universal affirmatives, and the conclusion a particular affirmative.

DARII, in logick, one of the modes of syllogisms of the first figure, wherein the major proposition is an universal affirmative, and the minor and conclusion particular affirmatives.

DATA, among mathematicians, a term for such quantities, lines, numbers, &c. as are given in any problem; and from whence the unknown parts of the problem are investigated.

DATE, in law, is the description of the day, month, year of our Lord, and year of the reign of the king, in which a deed or other writing was made.

DATE, *daetylus*, the fruit of the phoenix, or great palm-tree.

Dates are esteemed moderately strengthening and astringent, for which reason they are prescribed for diarrhoeas that are habitual, for weaknesses of the stomach, and for strengthening the womb; but at present we make little use of them in England. The best for medicinal purposes are those of Tunis, and the country thereabout, of Egypt and many parts of the east; the dates of Spain, and the south of France, though they look well, being never perfectly ripe, and very subject to decay. They are to be chosen large, full, fresh, of a yellow colour on the surface, soft and tender, not too much wrinkled, and such as have the pulpy part either of a good white throughout, or else reddish toward the surface, and white toward the kernel. Dates the hundred weight pay 1l. 14s. 4 $\frac{2}{3}$ d. on importation; and draw back on exportation 1l. 11s. 6d. They are preserved in three different ways; some pressed and dry, others pressed more moderately; but the best are those not pressed at all, only moistened with the juice of other dates, as they are packed up in baskets or in skins.

DATISI, in logick, a mode of syllogisms in the third figure, wherein the major is an universal affirmative, and the minor and conclusion particular affirmative propositions. For example,

DA- All who serve God are kings,

TI- Some who serve God are poor,

SI- Therefore some who are poor are kings:

DATIVE, in grammar, the third case of the declension



denion of nouns, expressing the state, or relation of a thing, to whose profit or loss some other thing is referred.

**DATURA**, thorn-apple, in botany, a genus of plants, whose flower is monopetalous and funnel-shaped, with five filulated filaments, topped with oblong compressed antheræ. The fruit is an oval, bilocular, prickly capsule; and contains a number of kidney-shaped seeds. The common thorn-apple is annual, and grows to the height of two feet. The leaves are large, angular pointed, and of a deep colour, with a very offensive foetid smell.

It flowers in July and August: and is a poisonous plant; taken inwardly, it causes vomiting, madness, convulsions, which are succeeded by death, if immediate help is wanting.

**DAUCUS**, the **CARROT**, in botany, a genus of plants belonging to the pentandria digynia class. The general flower is unequal: the proper one consists of five inflexo-cordated petals, the exterior ones being the largest. There is no pericarpium: the fruit is of an oval figure every way covered with rigid hairs, and is divisible into two parts: the seeds are two, of a sub-oval figure, convex and hairy on one side, and plain on the other.

There are two kinds of daucus-seeds kept in the shops, distinguished by the name of daucus Creticus, and daucus vulgaris. The seeds of the daucus Creticus come principally from Germany and the Levant: these seeds are to be chosen fresh, sound, and large, not dusty, and of an acrid taste. It is very apt to breed insects, and must, on that account, be carefully looked into, as it has no virtue when that is the case. The seeds of the Cretick and common daucus have the same general virtues; they are powerful diureticks; and much celebrated as carminatives and uterines: they attenuate thick and viscid humours, and promote the menses. Many people esteem the seed of the common daucus a remedy for the stone: the Cretick kind is one of the four lesser hot seeds of the shops.

**DAVIDISTS**, in church history, a sect of Christian hereticks, in the sixteenth century; so called from David George, their leader, who began by giving out that he was the Messiah, and was sent into the world in order to people the kingdom of heaven, which was quite empty of inhabitants, for want of virtuous and good men: he rejected marriage, and denied the resurrection.

**DAVIS'S QUADRANT**. See **QUADRANT**.

**DAVIT**, in naval affairs, a long beam of wood thrust out across from over the ship's fore-castle to draw up the flukes of the anchor clear from the ship's side.

**DAUPHIN**, a title given to the eldest son of France, and presumptive heir of the crown, on account of the province of Dauphiny, which in 1343 was given to Philip of Valois, on this condition, by Humbert, dauphin of the Viennois.

**DAY**, according to the most natural and obvious sense of the word, signifies that space of time during which it continues to be light, and thus is opposed to that wherein it is dark, which is called the night. But this space of time being somewhat vague and indeterminate, the time between the sun's rising and setting is usually looked upon as the day, and time which lapses, from its setting to its rising again, the night. But the word day is frequently taken in a larger sense, so as to include also the night, and to denote the time of an whole apparent revolution of the sun round the earth. In this sense, it is called by some a natural day, and by others an artificial one; but what some call the artificial, others call the natural.

Different nations began their day at a different hour: thus the Egyptians began their day at midnight, from whom Hippocrates introduced that way of reckoning into astronomy, and Copernicus and others have followed him: but the greatest part of astronomers reckon the day begun at noon, and so count twenty-four hours, till the noon of the next day; and not twice twelve, according to the vulgar computation. The method of beginning the day at midnight prevails also in Great-Britain, France, Spain, and most parts of

Europe. The Babylonians began their day at sun-rising, reckoning the hour immediately before its rising again the twenty-fourth hour of the day, from whence the hours reckoned in this way are called the Babylonick. In several parts of Germany, they began their day at sun-setting, and reckon on till it sets next day, calling that the twenty-fourth hour: these are generally termed Italian hours. The Jews also began their day at sun-setting; but then they divided it into twice twelve hours, as we do, reckoning twelve for the day, be it long or short, and twelve for the night; so that their hours continually varying with the day and night, the hours of the day were longer than that of the night, for one half year, and the contrary the other; from whence their hours are called temporary: those at the time of the equinoxes became equal, because then those of the day and night were so. The Romans also reckoned their hours after this manner, as do the Turks at this day.

**DAYS in Bank**, are days set down by statute or order of the court, when writs shall be returned, or when the party shall appear on the writ served. They say also, if a person be dismissed without day, he is finally discharged.

**DAYS of Grace**, are those granted by the court at the prayer of the defendant, or plaintiff, in whose delay it is.

**DAYS of Grace**, in commerce, are a customary number of days allowed for the payment of a bill of exchange, &c. after the same becomes due.

Three days of grace are allowed in England, ten in France and Dantzick; eight at Naples; six at Venice, Amsterdam, Rotterdam, and Antwerp; four at Frankfurt; five at Leipzig; twelve at Hamburg; six in Portugal; fourteen in Spain; thirty in Genoa, &c.

**DAY-LIGHT**, in our law; some time after sun-setting, and before sun-rising, being accounted part of the day, when the hundred is liable for any robberies committed within that time.

**DAY'S-MAN**, in the north of England, an arbitrator or person chosen to determine an affair in dispute.

**DAY-COAL**, among miners, an appellation given to the upper stratum of the coal, or that which lies next the surface of the earth. See **COAL**.

**DEACON**, one of the three sacred orders of the Christian church.

**DEAD**, in a general sense implies something without, or deprived of life.

**DEAD-EYES**, among seamen, implies a kind of blocks without shivers in them. They are fastened to the ends of the shrouds, chain-plates, stays, &c. and through which the laniards are received, in order to lighten them.

**DEAD-LIGHT**, among seamen, a sort of strong wooden posts, made exactly to fit the cabin windows: they are always fixed in on any expectation of a storm, and the glass windows taken out, which might otherwise be shattered to pieces by the sea, and let great quantities of water pour into the ship.

**DEAD-RECKONING**, in navigation, the judgment or estimation which is made of a place where a ship is, without any observation of the heavenly bodies; and is performed by keeping an account of her way by the log, in knowing the course they have steered by the compass, and by rectifying all the allowances for drift, lee-way, &c. according to the ship's known trim. This reckoning, however, is always to be corrected as often as any good observation can be obtained.

**DEAD-RISING**, or **RISE-FLOOR**, in ship-building, those parts of a ship's floor afore and abaft, where it begins to rise and grow narrower as it approaches nearer the stem and stern-post.

**DEAD-TOPS**, a disease incident to young trees, cured by cutting off the dead parts close to the next good twig or shoot, and claying them over, as in grafting. See the article **GRAFTING**.

**DEAD-WATER**, in the sea language, the eddy of water which closes in with a ship's stern, as she sails through it.

**DEAFNESS**, the state of a person who either wants the sense of hearing, or has it greatly impaired.

The



The causes of deafness are a cutting off the external ear, or an obstruction of the auditory passage, from wax, or other things; from a rupture of the membrane of the tympanum, or when it is corroded, or ulcerated, or the auditory nerve is obstructed or compressed. External causes are falls from high places; excessive noise, such as the explosion of cannon; likewise acute diseases near their state, which are like to terminate by a critical hæmorrhage.

DEAL, a thin kind of plank, sawn out of the fir-tree.

DEAN, an ecclesiastical dignitary in the cathedral and collegiate churches, and the head of the chapter.

DEATH, *Mors*, is generally considered as the separation of the soul from the body; in which sense it stands opposed to life, which consists in the union thereof.

DEATH-WATCH, in zoology, an insect nearly of the size of the common louse, frequent among old wood, furniture, &c. It is of an oblong and flattish figure, and of a pale brownish white colour; and the noise, resembling the beating of a watch, is the love note of these animals, when the male or female woo each other.

DE BENE ESSE, a Latin phrase used in our law in a doubtful meaning, as to take or do a thing *de bene esse*, is to allow it at present to be well done; but when it comes to be more fully examined, then to stand or fall, according to the merit of the thing.

DEBENTURE, a term of trade used at the custom-house, for a kind of certificate signed by the officers of the customs, which intitles a merchant exporting goods to the receipt of a bounty or drawback.

DEBENTURE, in some of the acts of parliament, denotes a kind of bond or bill first given in 1649, whereby the government is charged to pay the soldier, creditor, or his assigns, the money due on auditing the account of his arrears.

DEBENTURE, is likewise used in the exchequer, and given to the king's servants for the payment of their wages.

DEBILITY, among physicians, a relaxation of the solids, occasioning oftentimes weaknesses and faintings.

DECAGON, a plane figure in geometry, having ten sides and ten angles; and if all the sides are equal, and all the angles, it is called a regular decagon, and may be inscribed in a circle.

The word is formed from the Greek, *deka* ten, and *γωνια*, an angle.

The sides of a regular decagon are, in power and length, equal to the greatest segment of an hexagon, inscribed in the same circle, and cut in extreme and mean proportion.

If the sides of a regular decagon be one, the area thereof will be nearly 8.69; whence as 1 to 8.69, so is nearly the square of the side of any given decagon to its area.

DECAGYNIA, the name of an order, or subdivision in the Linnæan system of botany, and comprehends such flowers as have ten pistils or styles in each.

DECALOGUE, the ten precepts or commandments, delivered by God to Moses, written on two tables of stone, containing the basis of the religion of the Hebrews.

DECAMPING, in military affairs, is the marching of an army from the ground where it before lay encamped. See the article *CAMP*.

DECANDRIA, the name of the tenth class in the Linnæan system of botany; its characteristic is, that it consists of such plants as bear hermaphrodite flowers, furnished with ten stamina in each.

DECANTATION, in chymistry, is the pouring off a liquor from some precipitated matter, by gentle inclination.

DECASTYLE, in the ancient architecture, a building having ten columns in front.

DECEMBER, the tenth month in Romulus's year, who assigned it thirty days, which Numa reduced to twenty-nine, and Julius Cæsar increased it to thirty-one.

In this month the sun enters the tropick of Capricorn, and makes the winter solstice.

DECEMVIRI, in Roman antiquity, ten magistrates chosen annually at Rome, to govern the commonwealth instead of consuls, with an absolute power to draw up and make laws for the people.

There were also other decemviri, created on frequent emergencies, to manage and regulate certain affairs, as conducting colonies, presiding at feasts, taking care of sacrifices, keeping the sybils, books, &c.

DECENNALIA, ancient Roman festivals, celebrated by the emperors every 10th year of their reign, with sacrifices, games, and largesses to the people, &c.

The emperor Augustus first instituted these solemnities, in which he was followed by his successors. At the same time the people offered up vows for the emperor, and for the perpetuity of the empire; which were therefore called *vota decennalia*.

DECIDUOUS, is that which is apt or ready to fall, and is used in reference to the flowers and seeds of plants. Thus the botanists say, in some plants the perianthium or calyx is deciduous with the flower, i. e. falls from off the plant with it, but in others it is not.

DECIES *Tantum*, is a writ which lieth against a juror which hath taken money for the giving of his verdict; so called from the effect, because it is to recover ten times as much as he took.

DECII, in astronomy, an aspect or position of two planets when they are distant from each other a tenth part of the zodiack.

DECIMAL *Arithmetick*, the art of computing by decimal fractions, first invented by Johannes Regiomontanus, and used by him in the construction of his tables by fines, about the year 1464.

DECIMAL *Fractions*, those whose denominator is 1, with one or more cyphers; as, 10, 100, 1000, 10000, &c. Thus,  $\frac{5}{10}$ ,  $\frac{6}{100}$ ,  $\frac{7}{1000}$ , &c. are decimal fractions.

In the writing of decimal fractions we usually omit the denominator, as only consisting of unity with cyphers annexed; and in lieu thereof, a point, or comma, is prefixed to the numerator. Thus,  $\frac{5}{10}$  is written .5;  $\frac{46}{100}$ , .46. So .125 expresses an hundred twenty-five parts of any thing supposed to be divided into 1000 parts.

As cyphers on the right hand of integers increase their value decimally; as 2, 20, 200, &c. so when set on the left hand of decimal fractions, they decrease the value decimally; as 5.05, 005, &c. When set on the left hand of integers, or on the left of decimals, they signify nothing, but only to fill up places, thus, .5000 or 0005, is but five tenths, or five units.

To reduce any vulgar fraction, as suppose  $\frac{5}{8}$ , to a decimal fraction of the same value, whose denominator shall be 1000; say, by the Rule of three, as 8, the denominator of the vulgar fraction is to 5 the numerator: so will 1000, the denominator assigned, be to a fourth term, which, by working, will be found to be .625; and therefore  $\frac{625}{1000}$ , or .625, is a decimal of the same value with the former fraction  $\frac{5}{8}$ .

The common operations in decimals are performed as in the vulgar rules, regard being had only to the particular notation, to distinguish the integral from the fractional part of a sum.

In addition and subtraction of decimals, the points being placed all under each other, the figures are to be added, and subtracted as in common arithmetick; and when the operation is done, so many figures of the sum, or remainder, are to be noted for decimals, as there are places of decimals in the greatest numbers. An example will make this clear.

Addition of Decimals.

.44256	24.421
.439	15.024
.745	3.712
.031	12.531
.10	7.2
.4	
	62.888
2.15756	

Subtraction.

From 67.9
Take 24.876
Rem. 43.024
From 23.1462
Take 13.07
10.0762



For multiplication of decimals, observe to cut off just so many decimal parts from the product as there are decimals in both factors. The work is the same as in integers. Thus,

Multiplication of Decimals.

.1472	.365	3.650
.175	.122	621
<hr/>		
7360	730	3650
10304	730	7300
1472	365	21900
<hr/>		
.0257600	.044530	2266.650

Note, in the first and second examples the products only amount to six and five places; for this reason cyphers are prefixed to make up the numbers of decimal places in the two factors respectively.

In division of decimals, proceed in all respect as in dividing of integers; and, when the operation is finished, mark as many places in the quotient for decimals, as, with the number of decimals in the divisor, are equal to the decimal places of the dividend.

22).8030(3.65	22)8.030(.365
66	66
<hr/>	
143	143
132	132
<hr/>	
110	110
110	110
<hr/>	
...	...
<hr/>	
22).8030(.0365	73.2)83.219(1.13
66	732
<hr/>	
143	1001
132	732
<hr/>	
110	2699
110	2196
<hr/>	
...	503

There are, however, certain cases in division of decimals which require some further management: as, first, where the divisor is a decimal fraction, and the dividend is an integer; add, or annex, as many or rather more cyphers to the dividend than there are places in the divisor: thus, .365)22.0000(.602. For there being three places of decimals in the divisor, and four in the dividend, there will be but one in the quotient. Secondly, Where the divisor is a mixed number, and the dividend a whole number, add at least as many cyphers to the dividend, as there are places in the divisor: Thus, 36.5)22.0000(.602.

DECIMATION, a punishment inflicted by the Romans on such soldiers as behaved themselves cowardly in the field. The names of all the guilty were put into an urn or helmet, and as many were drawn out as made the tenth part of the whole number, and these were put to the sword, and the others saved.

DECIPHERING, an abstruse art of interpreting writings composed of several characters, so that the true sense and words of the writer shall be exactly known.

DECKS, in ship-building, the planed floors on which the men walk.

DECLAMATION, a speech made in publick, in the tone, voice, action, &c. observed in delivering an oration.

DECLARATION, in law, implies grounds of the plaintiff's complaint against the defendant, delivered in writing.

DECLENSION, in grammar, an inflexion of nouns, according to their various cases, as nominative, genitive, dative, and accusative. See each under proper article.

DECLINATION, in astronomy, the meridional distance of any celestial object, or point of the heavens, from the equinoctial: or it is the arch of the meridian intercepted between the object and the equinoctial.

It has been a great dispute among astronomers whether the greatest declination of the sun be variable. It is certain that the observations of the ancients make it considerably more than it is at present. Pytheas, who flourished three hundred and twenty-four years before Christ, found the greatest declination of the sun to be 23° 52' 41". Eratosthenes about an 100 years after found it to be 23° 51' 20"; but F. Riccioli shews, Eratosthenes wrongly concluded from his observations, that the greatest declination was 23° 51' 20" whereas according to them it should only have been 23° 31' and 20" the same as Gassendus found it to be at Marseilles about two thousand years after. But according to the accurate observations of Mr. Flamsteed, it is now only 23° 28' 58".

DECLINATION of the Sea Compass, or Needle, is its variation from the true meridian of any place.

DECLINATION of a Wall or Plane of Dials, is an arch of the horizon, contained either between the plane and the prime vertical circle, if you reckon it from the east or west; or else between the meridian and the plane, if you account it from the north or south.

DECLINATORIES, are instruments for taking the declinations, inclinations, and reclinations of planes.

DECLINING DIALS, are those whose planes stand perpendicularly to the horizon and decline; that is, do not face directly the four cardinal points.

DECLIVITY, denotes just the reverse of acclivity. See ACCLIVITY.

DECOCTION, in pharmacy, the boiling simples, or other drugs, in order to extract their virtues for some medicinal purpose.

DECOMPOSITION, in chymistry and pharmacy, the reduction of a body into its principle or component parts. See the article ANALYSIS.

DECOY. In a naval chace, it is usual for small ships of war to disfigure themselves in such a manner by painting, as to be mistaken for merchantmen, or ships of the enemy, in order to deceive and provoke the adversary to chase, at which time they are careful, by altering the trim of the ship, which is easily done, to prevent her from sailing fast, although at the same time they have a great sail abroad, and appear extremely anxious to escape.

DECOY, a place made for catching wild fowl. Hence,

DECOY-DUCK is a duck that flies abroad, and lights into company of wild ones, which by her allurements she draws into the decoy.

DECREE, an order made by a superior power for the regulation of an inferior.

DECREET, in the Scottish law, implies a final determination, decree, or judgment of the lords of session.

DECREPITATION, in chymistry, the act of calcining salt over the fire, till it ceases to crackle. The design of this is to free the salt from superfluous moisture: but as it is thereby rendered porous, and apt to imbibe the humidity of the air, it must always be kept very close afterwards, lest the air should moisten it a-new.

DECREPITATION is also applied to the crackling of the salts during the operation.

DECRETAL, in the canon-law, a letter of a pope, determining some point or question in the ecclesiastical law. The decretals compose the second part of the canon law.

DECUPLE PROPORTION, that of ten to one. See the article PROPORTION.

DECURRENT LEAF, one which adheres immediately to the stalk of a plant, without any pedicle, and which has its lower part extended, and running a little way along the branch.

DECUSSATION, a term in geometry, opticks, and anatomy, signifying the crossing of any two lines, rays, or nerves, when they meet in a point, and then go on separately from one another.

DECUSSORIUM, a surgeon's instrument, which, by pressing gently on the dura mater, causes an evacuation of the pus, collected between that membrane and the cranium, through the perspiration made by the trepan.

DEDICATION, a solemn devoting, or setting apart



apart any person or thing to the service of God, and the purposes of religion.

DEDICATION, in literary matters, implies the inscribing a book, pamphlet, play, &c. to some person or society.

DEED, an instrument written on paper or parchment: comprehending some contract, or agreement between the contracting parties.

DE FACTO, something actually existing, in contradistinction to "de jure," where a thing does not actually exist, though it ought to do so according to law.

DEFAMATION, the act of speaking defamatory or slanderous words of another person.

DEFECTIVE, an epithet applied to things which want some of the properties that they ought to have.

DEFENCES, in fortification, are all sorts of works that cover or defend any place, post, &c.

*Line of DEFENCE*, an imaginary line supposed to be drawn from the angle of the curtain to the flanked angle of the opposite bastion.

DEFENCE, in law, implies the plea of the defendant, after the plaintiff has made his declaration.

DEFENDER *of the Faith*, a title given by pope Leo the Tenth to king Henry the Eighth, for his writing a book against Luther; and has ever since been retained by the kings of Great Britain.

DEFENSITIVE, in surgery, implies a bandage, plaister, &c. which defends any part from external injuries.

DEFERENT, in anatomy, is an epithet given to certain vessels in the human body, serving for the conveyance of the fluids from one part to another.

DEFERENT, in the Ptolemaick system of astronomy, implies an imaginary circle, invented to account for the excentricity, perigee and apogee of the planets.

DEFICIENT HYPERBOLA, one with only one asymptote, and two hyperbolical legs running out infinitely towards the asymptote, but contrary ways.

DEFICIENT INTERVAL, in musick, one less by a comma than it ought to be.

DEFICIENT NUMBERS, those whose parts or multiples, added together, fall short of the integer, whereof they are the parts; such is 8, its parts, 1, 2, 4, making only 7. See the article NUMBER.

DEFILE, in fortification, a straight narrow passage, through which a company of horse or foot can pass only in file, by making a small front; so that the enemy may take an opportunity to stop their march, and to charge them with so much the more advantage, in regard that those in the front and rear cannot reciprocally come to the relief of one another.

DEFINITE, in grammar, is applied to an article that has a precise determinate signification; such as the article *the* in English, *le* and *la* in French, &c. which fix and ascertain the noun they belong to, to some particular, as *the king*, *le roy*; whereas in the quality of *king*, *de roy*, the articles *of* and *de* mark nothing precise, and are therefore indefinite.

DEFINITION, the shewing the meaning of one word by several other not synonymous terms.

DEFINITION, in rhetoric, is defined, by Cicero, a short comprehensive explanation of a thing.

DEFLAGRATION, in chymistry, the kindling or setting fire to a salt, mineral, &c. either alone or mixed for that purpose, with a sulphureous one, in order to purify it.

DEFLECTION *of the Rays of Light*, the same with inflection. See the article INFLECTION.

DEFLUXION, in medicine, the falling of humours from a superior to an inferior part of the body.

DEFORCEMENT, in law, the casting any one out of his land, or with-holding of lands and tenements by force from the right owner.

DEFTERDAR, or DEFTARDAR, in the Turkish and Persian polity, an officer of state, answering to our lord-treasurer, who appoints deputies in every province.

DEGLUTITION, in medicine, the act of swallowing the food, performed by means of the tongue driving the aliment into the oesophagus, which, by the contraction of the sphincter, protrudes the contents down-wards.

DEGRADATION, the act of depriving a person

for ever of a dignity or degree of honour, and taking away the title, badge, and privileges of it.

DEGRADATION, in painting, expresses the lessening the appearance of distant objects in a landscape, in the same manner as they would appear to an eye, placed at that distance from them.

DEGRADED CROSS, in heraldry, a cross divided into steps at each end, diminishing as they ascend towards the centre, called by the French *petronnée*.

DEGREE, in geometry, a division of a circle, including a three hundred and sixtieth part of its circumference.

Every circle is supposed to be divided into three hundred and sixty parts, called degrees, and each degree divided into sixty other parts, called minutes; each of these minutes being again divided into sixty seconds, each second into thirds, and each third into fourths, and so on. See the articles MINUTE, SECOND, &c.

DEGREE *of Longitude*. See LONGITUDE.

DEGREE *of Latitude*. See LATITUDE.

A degree of the meridian on the surface of the globe is variously determined by various observers. Mr. Picart measured a degree in the latitude of  $49^{\circ} 21'$ , and found it equal to 57060 French toises. But the French mathematicians, who have lately examined Mr. Picart's operations, assure us, that the degree in that latitude is 57183 toises. Our countryman, Mr. Norward, measured the distance between London and York, and found it 905751 English feet, and finding the difference of latitudes  $2^{\circ} 28'$ , determined the quantity of one degree to be 367196 English feet, or 69 English miles, 288 yards. Mr. Maupertuis measured a degree in Lapland, in the latitude of  $66^{\circ} 20'$ , and found it 57438 toises. A degree was likewise measured at the equator by other French mathematicians, and found to contain 567678 toises. Whence it appears, that the earth is not a sphere, but an oblate spheroid.

DEGREE, in the civil and canon law, denotes an interval in kinship, by which proximity and remoteness of blood are computed.

DEGREE, in chymistry, denotes the state or intenseness of fire. See FIRE.

DEGREES, in musick, are the little intervals whereof the concords, or harmonical intervals, are composed.

DEGREE, in universities, denotes a quality conferred on the students or members thereof as a testimony of their proficiency in the arts or sciences, and entitling them to certain privileges.

The degrees are much the same in all universities, but the laws thereof, and the previous discipline or exercise differ. The degrees are bachelor, master, and doctor; instead of which last, in some foreign universities, they have licentiate.

In each faculty there are two degrees, bachelor and doctor, which were anciently called bachelor and master. In the arts likewise there are two degrees which still retain the ancient denomination, viz. bachelor and master.

DEHORS, in the military art, all sorts of out-works placed at some distance from the walls of a fortification, the better to secure the main places, and to protract the siege, &c.

DEIFICATION, in antiquity, the same with apotheosis. See the article APOTHEOSIS.

DEINCLINERS, or DEINCLINING DIALS, are such as both decline and incline, or recline at the same time.

DEISM, the system of religion acknowledged by the deists.

DEISTS, in the modern sense of the word, are those persons in Christian countries, who, acknowledging all the obligations and duties of natural religion, disbelieve the Christian scheme, or revealed religion. They are so called, from their belief in God alone, in opposition to Christians.

DEITY, a term frequently used in a synonymous sense with God. See the article GOD.

DELEGATES, commissioners appointed by the king under the great seal to hear and determine appeals from the ecclesiastical court.

DELETERIOUS, an appellation given to things of destructive or poisonous nature.

DELF,



**DELF** denotes a quarry or mine, where either stone or coal is dug; but is more particularly used for the veins of coal lying under ground, before it is dug up. A delf, or delve of coals, also denotes a certain quantity when dug.

**DELF**, in heraldry, is by some supposed to represent a square sod or turf, and to be so called from delving or digging.

**DELIA**, in antiquity, feasts celebrated by the Athenians in honour of Apollo, surnamed Delius.

**DELIA** was also a quinquennial festival in the island of Delos, instituted by Theseus, at his return from Crete, in honour of Venus, whose statue, given him by Ariadne, he erected on that place.

**DELIACK**, or **DELIACAL PROBLEM**, a problem much celebrated in the writings of the ancients, concerning the duplication of the cube. See **DUPLICATION** and **CUBE**.

**DELINEATION**, or **DELINEATING**, the same with designing. See the article **DESIGNING**.

**DELINQUENT**, a guilty person, or one who has committed some fault or offence, for which he is punishable.

**DELIQUIUM**, in chymistry, signifies the solution of any body, when exposed to a cool and damp place, by the humidity it attracts from the air. The salt of tartar dissolved in the above manner is called oil of tartar per deliquium.

**DELIRIUM**, in medicine, the production of ideas not answerable to external causes, from an internal indisposition of the brain, attended with a wrong judgment following from those ideas, and an affection of the mind, and motion of the body, accordingly: and from these increased through various degrees, either alone or joined together, various kinds of deliria are produced.

The causes of deliria are numerous; such as fevers, wounds in the head, internal inflammations, and immoderate losses of blood, whereby the brain is either disordered or weakened. It also arises from the seed or menses being retained in the womb, from the rotting of a gangrened member, &c. When a fierce and continual delirium is produced by an acute fever, from the brain itself originally affected, it is called a phrenzy: but a simple delirium only attends a violent fit of an intermitting fever; so that when the paroxysm is off, the delirium ceases.

Many are the signs of a delirium; as gnashing of the teeth, a fierce and wild aspect, a pulsation in the hypochondrium and belly, watchings, vomiting of bile, in pains of the head, a tremor, or trembling of the tongue, &c. to all which Galen adds, the doing any thing unusual or indecent.

Various methods of cure, and different remedies, are to be chosen agreeable to the difference of the causes; but the chief of these remedies are warm bathing of the feet, with the application of blisters to them, and to the ham; frictions upon the same parts; diluent clysters often applied; a thin diet, and healing, quieting, deobstruent and diluent drinks; emollient remedies applied to the head; gentle purges; bleeding in the foot, a bringing down of the piles, or menstrual discharge, &c.

A delirium is always a bad sign in wounds of the head, because it denotes that the brain itself is injured.

**DELIVERY**, **CHILD-BIRTH**, or **PARTURITION**, in medicine and surgery, the bringing forth a perfect foetus, or child, from its mother's womb, whether it be alive or dead. See the article **FOETUS**.

In order to attain the knowledge of difficult child-births, it is necessary to form a just idea of those that are natural.

The time of the natural birth is, from the 15th day of the ninth month, to the end of the 30th of the same: yet some women affirm it may be sooner or later. Hoffman says, the usual time is nine solar months; and Junker, that excretions from the uterus being by women referred to certain lunar phases, they reckon their going with child by the weeks, and that they usually bring forth the foetus forty weeks from the time of their being with child, commonly on that very day they were used to have their menses.

**DELPHINUS**, the Dolphin, in astronomy, a constellation of the northern hemisphere; whose stars, in Ptolemy's and Tycho's catalogues, are ten; and in Flamsteed's eighteen.

**DELTOIDES**, in anatomy, a thick triangular muscle of the arm, being one of the three elevators.

This muscle arises from the clavicle, and the acromion and spine of the scapula; and terminates at four fingers breadth below the neck of the humerus.

**DELUGE**, an inundation or overflowing of the earth, either wholly or in part, by water.

We have several deluges recorded in history, as that of Ogyges, which overflowed almost all Attica; and that of Deucalion, which drowned all Theffaly in Greece; but the most terrible was that which is called the universal deluge, or Noah's flood, which overflowed and destroyed the whole earth, and out of which only Noah and those with him in the ark escaped.

Men have been very solicitous to account for this dismal catastrophe philosophically, and to find out from whence such an amazing quantity of water should come, as was necessary to cover all our globe, to the height of fifteen cubits above the highest hills; for to that height Moses saith expressly, Gen. vii. 20: "The waters prevailed:" and some have been so bold as to deny the existence of any mountains before the flood, though he expressly mentions them as a standard for the height of the water: and others have denied the universality of the deluge, though the text be as plain as words can deliver, "that all the hills over the whole earth were covered." Others have recourse to the shifting of the earth's centre of gravity, and so will have its parts all drowned successively. Our famous theorist Dr. Burnet makes an earth, as it were on purpose, to be drowned at that time, which, being in the form of an orbicular crust on the face of the sea, as we now call it; for he says there was none before the deluge, fell down into the water, and so drowned its inhabitants.

But the holy scriptures tell us, that the waters of the deluge came from two funds, the "great deep below," and the "rains above." Again, when we look into internal parts of the earth, even to the greatest depth men have ever reached, we find, that the body of the terrestrial globe is composed of strata, or layers laying one over another, and which appear to be sediments of a flood: besides, in the bodies of these strata, though never so solid, nay even inclosed within the solidity of the firmest flints, marble, stone, &c. we find a prodigious variety of exuviae or remains of fishes, as shells, teeth, &c. as well marine ones as those that live in lakes and rivers; and from a due observation of these, and repeated considerations upon them, it was, that the learned Dr. Woodward founded what he delivers upon this subject; as they are laid down in the second part of his natural history of the earth.

1. That these marine bodies, and the other exuviae of fresh water fishes, were carried forth from the sea, and, on the return of the water from off the earth, they were left behind on the land.

2. That, during the time of the deluge, all the stone and marble of the antediluvian earth, all the metals in it, all the mineral concretions, and, in a word, all fossils whatever, that had before attained any solidity, were totally dissolved; their constituent corpuscles were disjoined, and their cohesion perfectly ceased; and that the said corpuscles, together with the corpuscles of those which were not before solid, such as sand, earth, and the like, as also all animal bodies, teeth, shells, vegetables, and parts of vegetables, trees, shrubs, herbs, and, in short, all bodies whatsoever that were either upon the earth, or that constituted the mass, if not quite down to the abyss, yet quite down to the greatest depths we ever dig; all these were assumed up promiscuously into the water, and sustained therein; so that the waters and bodies in it together made up one common mass.

3. That at length all the mass that was thus borne up in the water, was again precipitated and subsided toward the bottom: and that this subsidence happened generally according to the laws of gravity: that matter which had the greatest degree of gravity subsiding first in order; that which had the next, subsiding next after; and



and so in their several courses : that which had the least gravity sinking not down till last of all, but settling at the surface of the sediment : that the matter, subsiding thus, formed the strata of stone, earth, marble, coal, &c. of which strata the terrestrial globe, or at least as much of it as hath ever been displayed to human view, principally consists.

4. That the strata of marble, &c. attained their solidity, as soon as the sand or other matter, whereof they consist, was arrived at the bottom, and well settled there ; and that all those strata which are solid at this day, have been so ever since that time.

5. That these strata were all originally parallel, plane, and regular ; consequently they rendered the surface of the earth even and spherical ; that they were contiguous, and not broken and interrupted, as we find them now ; and that the whole mass of the water lay then upon them, constituted a fluid sphere environing all the globe round.

6. That after some time, by the force of an agent seated within the earth, these strata were broken on all sides the globe ; that they were dislocated, being elevated in some places, and depressed in others ; and from thence arose all the mountains, vallies, and other inequalities of our present earth's surface ; all the caverns and grottos, all the perpendicular and horizontal fissures, the channel of the sea, all islands, &c. In a word, the whole terraqueous globe, was, by this disruption of the strata, put into the condition we now behold it.

And afterwards, in part the third, he concludes from his observations,

1. That Noah's deluge was truly universal, covering the whole earth, even the highest mountains quite round the globe.

2. That, at the time of the Deluge, the water of the ocean was first brought out on the earth, and immediately succeeded by that of the abyss.

3. That upon the disruption of the strata, and the elevation of some, and depression of others, towards the end of the Deluge, this mass of water fell back into the lowest parts of the earth, into lakes and other cavities, into the channel of the ocean, and through the fissures by which this communicates with the ocean in the abyss, which it filled till it came to an equilibrium with the ocean.

4. That the Deluge commenced in the spring season, the water coming forth upon the earth in the month which we call May.

5. That the Deluge did not happen from an accidental concurrence of natural causes ; but that many things were then done, which never could possibly have been done without the assistance of supernatural power : that the said power acted in this matter with design, and with the highest wisdom ; and that, as the system of nature was then and is still supported, a Deluge neither did nor could happen naturally.

DEMAND, in law, the calling upon a person for any thing that is due.

There are two kinds of demands, the one in deed, and the other in law. And these are again divided into three sorts ; one in writing, without speaking, as in every writ of præcipe ; another without writing, being a verbal demand of the person who is to perform something ; and another made without either words or writing, which is termed a demand in law, as in cases of entries on lands, &c. And as an entry upon land and taking distress for rent, are a demand in law of the land and rent, so the bringing an action of debt for money due on a bond, is a demand in law of the debt.

Debts and claims are to be demanded in time by the statute of limitations, or they will be lost by law.

DEMANDANT, in law, the plaintiff, or person who sues in real actions.

DEMI, a word used in composition, and signifies half.

DEMI-BASTION, a half bastion, or a fortification with only one face and one flank.

DEMI-CANNON *lowest*, the name of a piece of ordnance, usually about six inches bore, five thousand four hundred pounds weight, ten or eleven feet long, and

carries a shot about thirty pounds weight. It carries point-blank one hundred and fifty-six paces, and its charge of powder is fourteen pounds.

DEMI-CANNON *ordinary*, which is six inches and a half bore, twelve feet long, weighs five thousand six hundred pounds : its charge of powder is seventeen pounds eight ounces, and carries a shot of six inches one-eighth in diameter, whose weight is thirty-two pounds ; the piece shoots point-blank one hundred and sixty-two paces.

DEMI-CANNON *of the longest Size*, is six inches three-fourths bore, twelve feet long, and six thousand pounds weight : its charge is eighteen pounds of powder, and the piece shoots point-blank one hundred and eighty paces.

DEMI-CROSS, is an instrument used by the Dutch to take the altitudes of the celestial bodies at sea ; it consists of a staff divided into a line of tangents, and a cross-piece or transom, and has three vanes. But we do not use this instrument, our sea-quadrant being much better.

DEMI-CULVERIN, a piece of ordnance usually four inches  $\frac{1}{2}$  bore, 2700 pounds weight, ten feet long, and carrying point-blank 175 paces.

DEMI-CULVERIN *of the least Size*, is four inches  $\frac{1}{4}$  bore, ten feet long, and 2000 pounds weight. It carries a ball of four inches diameter, and of nine pounds weight, and its level range is 174 paces.

DEMI-CULVERIN *of the largest Size*, is four inches  $\frac{3}{4}$  bore, ten feet  $\frac{1}{3}$  long, and weighs 3000 pounds weight. It carries a ball of four inches  $\frac{1}{2}$  diameter, weighing twelve pounds eleven ounces, point-blank 178 paces.

DEMI-GORGE, in fortification, is half the gorge or entrance into the bastion, not taken directly from angle to angle, where the bastion joins to the curtain, but from the angle of the flank to the centre of the bastion, or angle the two curtains would make, were they protracted to meet in the bastion.

DEMI-SEMIQUAVER, in musick, the shortest note, two of them being equal to a semiquaver.

DEMOCRACY, a form of government, where the sovereignty or supreme authority is lodged in the people, who exercise it by persons of their own order, deputed for that purpose.

DEMONSTRABLE, an epithet applied to facts capable of being demonstrated.

DEMONSTRATION, a method of reasoning, whereby the mind clearly perceives the agreement or disagreement between the ideas it considers. This knowledge, though it be certain, is not so clear and evident as intuitive knowledge. It requires pains and attention, and steady application of mind, to perceive the agreement or disagreement it considers ; and there must be a progression by steps and degrees, before the mind in this way can arrive at certainty. Before demonstration, there was a doubt, which in intuitive knowledge cannot happen to the mind that has its faculty of perception left to a degree capable of distinct ideas, no more than it can be a doubt to the eye that can distinctly see white and black, whether this ink and paper be all of a colour.

It has generally been taken for granted, that mathematicks alone is capable of demonstrative certainty ; but wherever the mind can perceive the agreement or disagreement of any two ideas, by an intuitive perception of the agreement they have with any intermediate ideas, there the thing is capable of demonstration, which is not limited to the ideas of figures, numbers, extension, or their modes. There are two things required in just demonstration ; first, that every proposition of which it consists, considered separately, be true ; secondly, that the consequences drawn from other foregoing things, necessarily flow from them ; or that all the consequences be contained in the antecedents or premises. Demonstration is of two kinds, the one a priori, the other a posteriori. Demonstration a priori, which alone, to speak properly, is demonstration, is that by which the effect is demonstrated by its cause ; as when we prove the existence of light by the existence of the sun. Demonstration a posteriori, is when we demon-



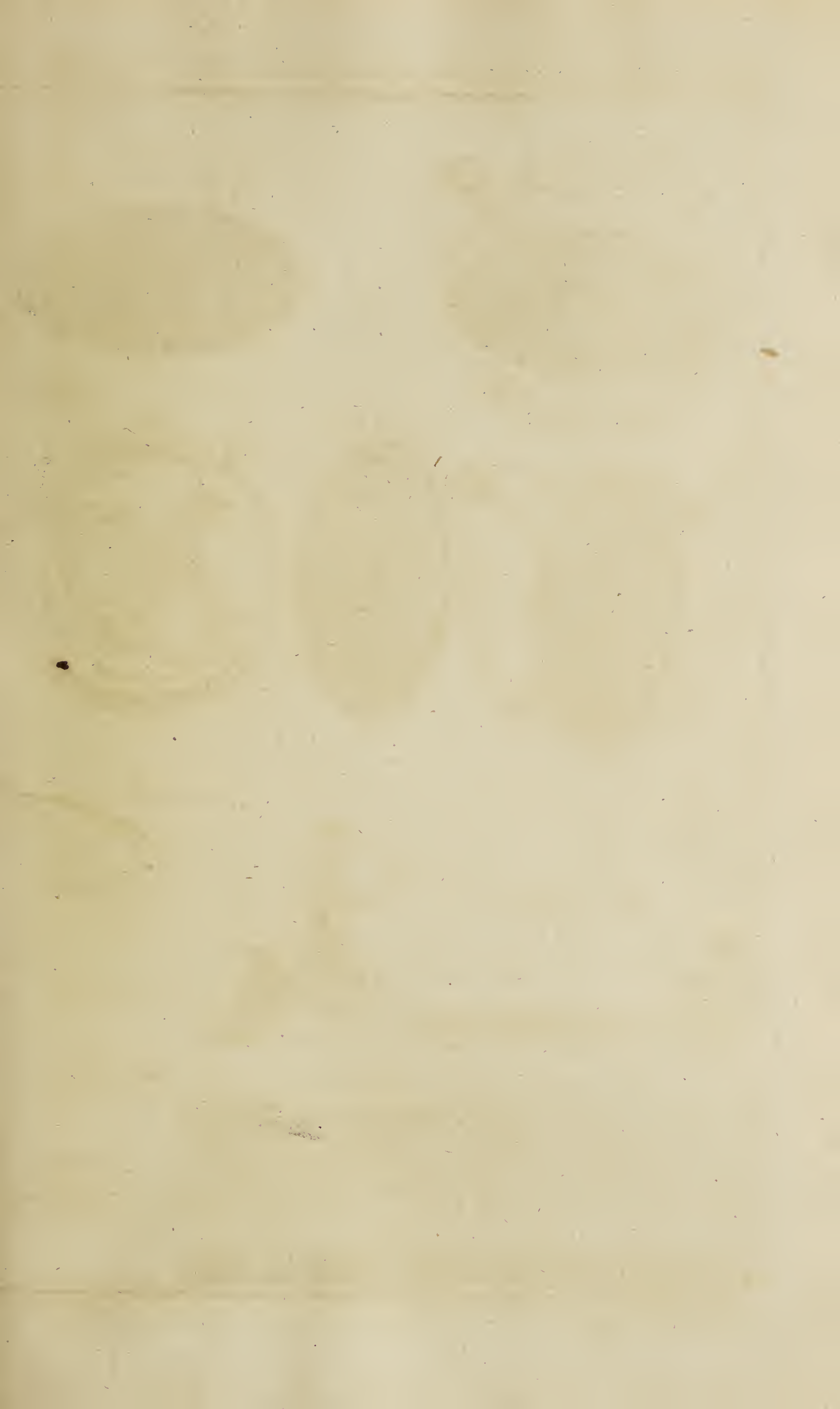




Fig. 1. Dial

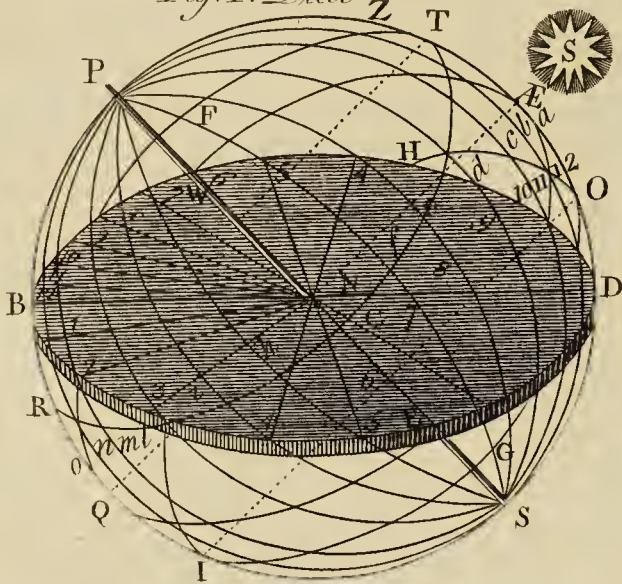


Fig. 2. Dial

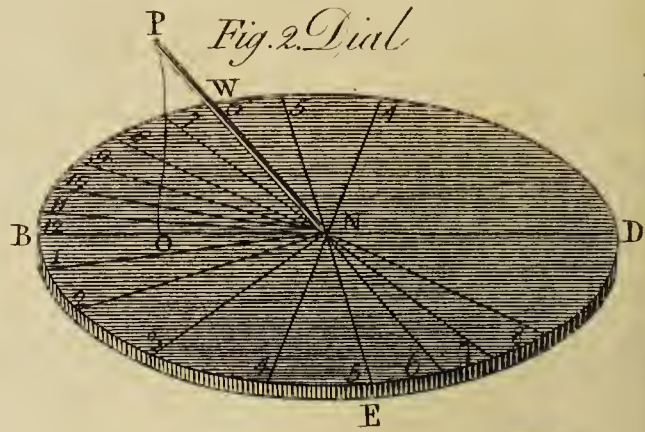


Fig. 4. Dial

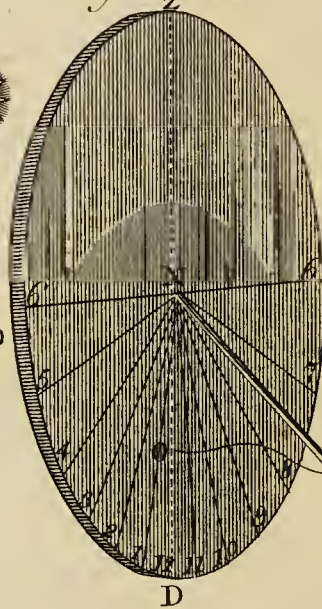


Fig. 3.

Dial

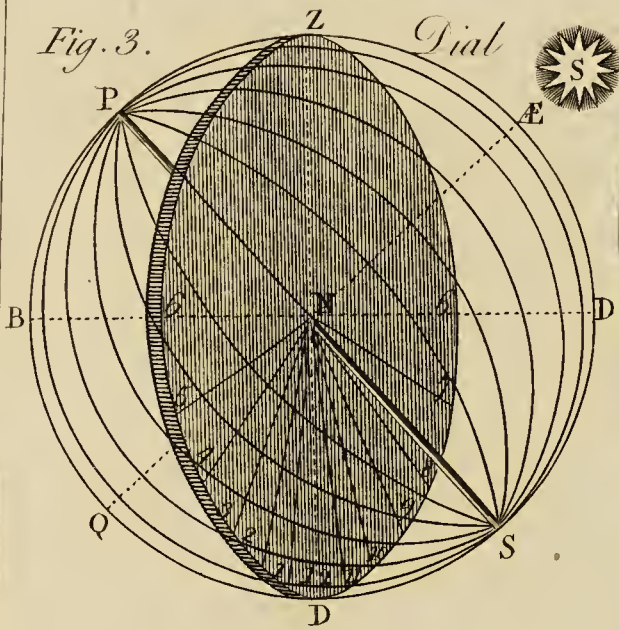


Fig. 5. h

Dial

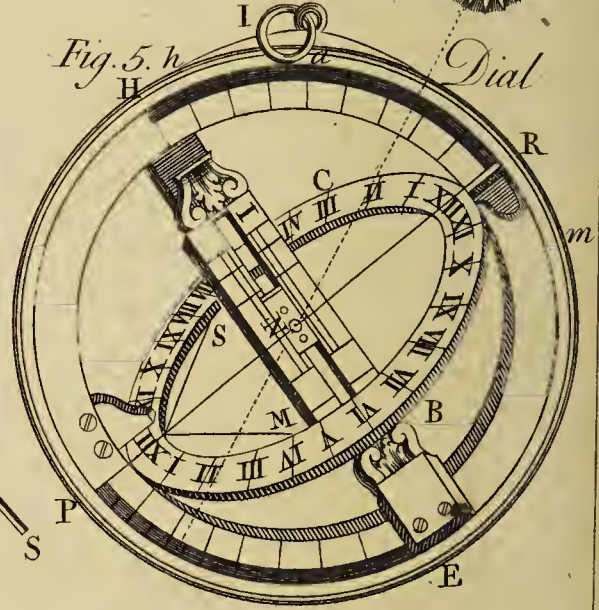
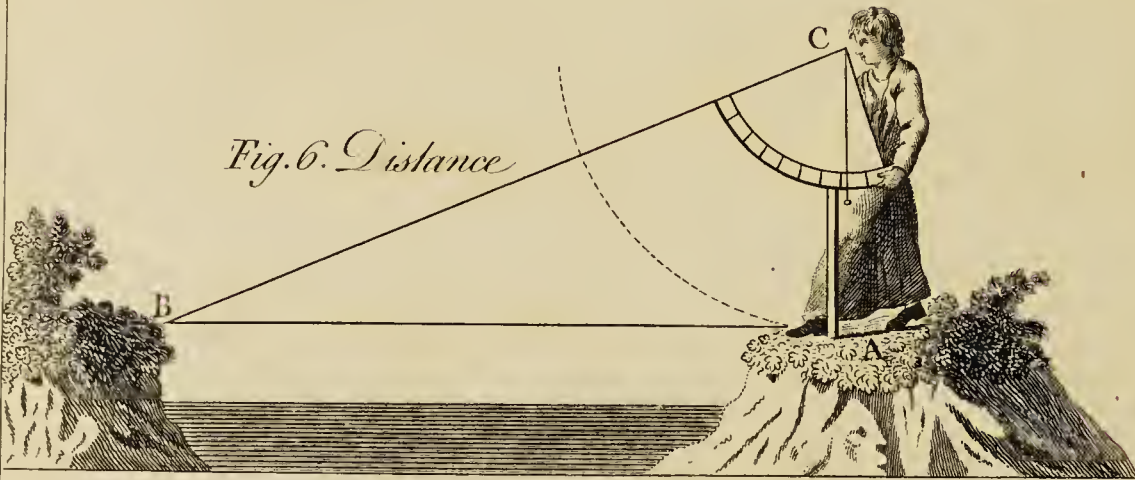


Fig. 6. Distance



Distance

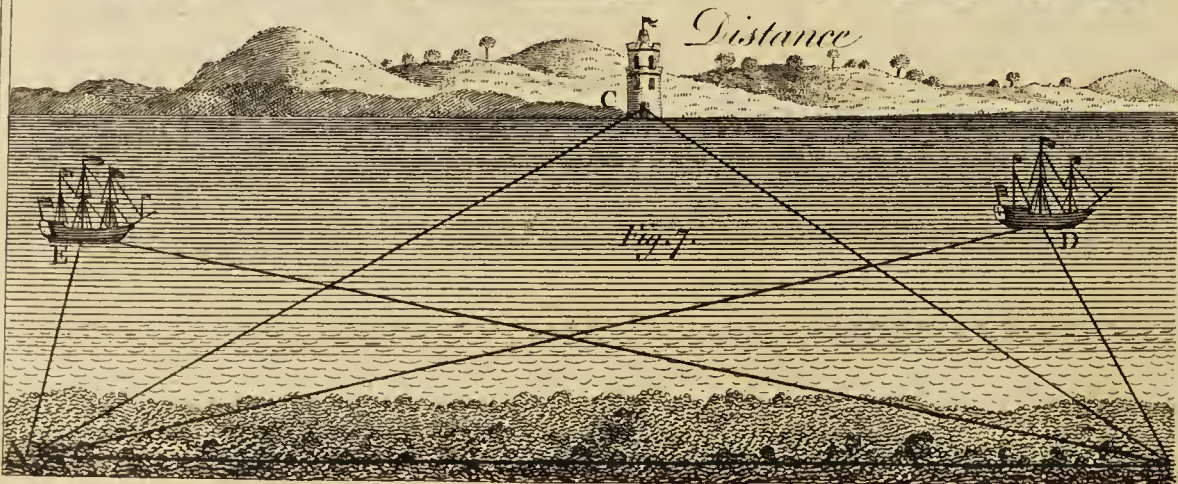


Fig. 7.

Fig. 8. Divisibility

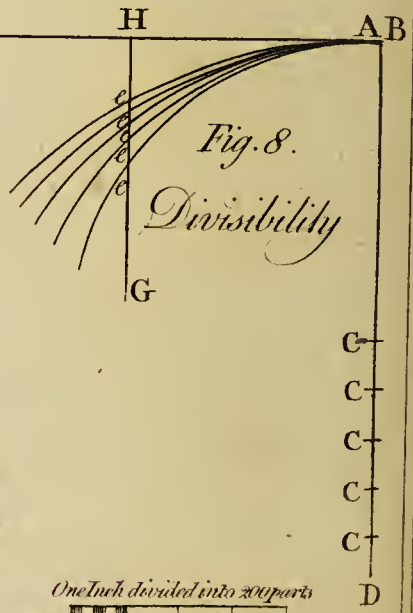


Fig. 9.

One Inch divided into 200 parts

Fig. 10.





demonstrate the cause by the effect; as when we prove the existence of the sun from the existence of light. To this kind of demonstration may also be reduced the demonstration which is made from the remote cause; as when one proves that a stone doth not breathe, because it is not an animal, when it would have been more proper to have proved it by this, because it has no lungs; yet that, though nearer, is not the direct property of an animal, since many animals, as oysters, &c. have no lungs. Authors also mention another kind of demonstration, called ostensive; which is when a thing is demonstrated from proper principles directly, and by itself. To this they have added another kind of demonstration, which they call deductive to an inconvenience; which, though it be inferior to the former, yet may be of use where we cannot have an ostensive demonstration, as being also of inseparable necessity: and this is when we demonstrate a thing to be so, because, if it should be otherwise, either an absurdity, an impossibility, or a contradiction will necessarily follow.

**DEMONSTRATIVE**, in rhetoric, one of the kinds of eloquence, viz. that which obtains in the composition of panegyrics, invectives, &c. See the article **RHETORICK**.

**DEMONSTRATIVE**, in grammar, a term given to such pronouns, as serve to indicate or point out a thing. Of this number are *hic, hæc, hoc*, among the Latins; and *this, that, these, those*, in English. See **PRONOUN**.

**DEMULCENTS**, among physicians, medicines good against acrimonious humours. Such are the roots of marsh-mallows, of white lillies, of liquorice, and of viper grass, the five emollient herbs, &c. See the article **EMOLLIENTS**.

**DEMURRAGE**, in commerce, an allowance made to the master of a ship by the merchants, for staying in a port longer than the time first appointed for his departure.

**DEMURRER**, in law, a stop put to any action upon some point of difficulty which must be determined by the court, before any further proceedings can be had in the suit.

**DEMURRER to Evidence**, is where a question of law arises thereon; as if the plaintiff in a suit gives in evidence any records, deeds, writings, &c. upon which a law-question arises, and the defendant offers to demur upon it, then the plaintiff must join in such demurrer, or wave his evidence.

**DEMURRER to Indictments**, is when a criminal joins issue upon a point of law in an indictment or appeal, allowing the fact as laid to be true. And if the indictment, or appeal, prove good in the opinion of the judges by whom the demurrer is to be tried, and not by the inquest, they proceed to judgment and execution, as if the party had been convicted by confession or verdict.

**DEN**, a syllable which, added to the names of places, shews them to be situated in vallies, or near woods, as Tenderden.

**DEN** and **STROND**, in law, was anciently a liberty for ships to run or come ashore.

**DENARIATE OF LAND**, *denariatus terræ*, in old law-books, signifies as much as was worth a penny by the year.

**DENARIUS**, in Roman antiquity, the chief silver coin among the Romans, worth in our money about seven-pence three farthings. As a weight it was the seventh part of a Roman ounce. See **COIN**. **WEIGHT**.

**DENARIUS**, is also used in our law-books for an English penny.

**DENDRITÆ**, in natural history, a name given to those species of septariæ which have representations of trees, &c.

**DENEB**, an Arabick term signifying tail, used by astronomers to denote several fixed stars. Thus deneb elecet, signifies the bright star in the lion's tail. Deneb adigege, that in the swan's tail, &c.

**DENIER**, a small French copper coin, of which twelve make a sol.

**DENIZEN**, in law, an alien made a subject by the king's letters patent, otherwise called donaison, because his legitimation proceeds *ex denatione regis*, from the king's gift.

**DENOMINATION**, a name imposed on any thing, usually expressing some predominant quality.

**DENOMINATIVE QUALITY**, that quality from which things take their denomination.

**DENOMINATOR**, in arithmetick, a term used in speaking of fractions.

The denominator of a fraction is the number below the line, shewing into how many parts the integer is supposed to be divided. Thus in the fraction  $\frac{3}{4}$ , the number 4 shews that the integer is divided into four parts. So in the fraction  $\frac{a}{b}$ , *b* is the denominator.

See the article **FRACTION**.

Denominator of a ratio is the quotient arising from the division of the antecedent by the consequent. Thus 8 is the denominator of the ratio 40:5, because 40 divided by 5, gives 8 for a quotient. It is also called the exponent of a ratio. See **EXPONENT**.

**DENSHRING**, or **DEVONSHRING**, in husbandry. See **BURN-BAKING**.

**DENSITY** of *Bodies*, or fluids, in physicks, is that property or habitude whereby they contain a certain quantity of matter under a certain bulk; accordingly, that body which contains more matter than another under the same bulk, is said to be denser than that other.

The laws of density, in general, are as follows:

1. Bodies of the same density contain equal masses under equal bulks.
2. If the bulks of two bodies are equal, their densities are as their masses. Consequently,
3. The densities of equal bodies are as their gravities.
4. If two bodies have the same density, their masses are as their bulks.
5. The quantities of matter contained in any two bodies are in a ratio compounded of their density and bulk. It will therefore follow, that their gravity is in the same ratio.

6. If the masses, or gravities of two bodies, are equal, their densities are reciprocally as their bulks.

7. The densities of any two bodies are in a ratio compounded of the direct ratio of their masses, and a reciprocal one of their bulks. Consequently,

8. Since the gravity of bodies is as their masses, their densities are in a ratio compounded of the direct ratio of their gravities, and a reciprocal one of their bulks.

Note, The same properties, or laws of density, are to be observed with regard to fluids of all kinds whatever.

**DENTALIUM**, in natural history, a simple shell having no hinge, and formed only of one piece: it is of a figure approaching to cylindrick or conick, and is sometimes crooked, sometimes straight; sometimes closed at one end, sometimes open at both: its animal inhabitant is called nereis.

Great things have been recorded of the virtues of the Dentalium, but the readiness of oyster-shells has quite thrown it out of use.

**DENTARIA**, toothwort, in botany, a genus of plants, bearing cruciform flowers, each of which consists of four obtuse petals, with six stamina, two of which are shorter than the others. The fruit is a long, cylindrical, bilocular pod, opening with two valves, and includes a number of roundish seeds.

The root is the only part used in medicine, and is accounted drying and astringent.

**DENTATED LEAF**, among botanists, one notched at the edges with a number of blunt points, in some measure resembling teeth.

**DENTICLES**, or **DENTILS**, in architecture, an ornament in corniches, bearing some resemblance to teeth, particularly used in the Ionick and Corinthian orders. They are cut on a little square member, properly called denticulus, and the notches or ornaments themselves, dentils. In the ancient times dentils were never used in the Ionick cornice, yet they are found in the remains of the theatre of Marcellus, which some take for an argument that Vitruvius had not the direction of that building. Vitruvius prescribes the breadth of each dentil to be half its height, and the indentine or interval between each two, he directs to be two thirds of the breadth of the dentil.



**DENTIFORM PROCESS**, in anatomy. See the article **PYRENOIDES**.

**DENTIFRICE**, in medicine, a remedy for rubbing the teeth, and purging them from fordes; and for cleansing and absterging the gums, when replete with humours. There are dentrifices of various kinds and forms, some in form of a powder composed of corals, pumice-stone, salt, alum, egg-shells, crabs-claws, hartshorn, &c.

The generality of operators for the teeth allow acids, such as spirit of salt, &c. to be the readiest of all dentrifices, to take off the foulness and yellowness of the teeth.

**DENTILS**, in architecture, the same with denticles. See the article **DENTICLES**.

**DENTITION**, the breeding, or cutting, the teeth in children.

Among all the disorders which afflict children, there are none generate such grievous symptoms as difficult dentition. About five or six months after birth, the teeth generally begin to make their appearance: first, the incisores, or fore-teeth; next, the canini, or dog-teeth; and, lastly, the molares, or grinders. About the seventh year there comes a new set; and at twenty-one the two inner grinders, called dentes sapientiae, or teeth of wisdom. At the time of cutting their teeth, they slobber very much, and have a diarrhæa, which is no bad sign: but when it is difficult, especially when the canine teeth begin to be in motion, and make their way out through the gums, the child has startings in his sleep, tumours of the gums, gripes, a looseness or costiveness, greenish stools, the thrush, fevers, difficult breathing, suffocating catarrhs, convulsions, and epilepsies, which often end in death.

It shews the dentition is like to be bad, if the child is perpetually crying, thrusts his finger into his mouth, and bites the nurse's nipples; if unequal tubercles are perceived in the gums, where the teeth are expected to appear; if there is a heat in the mouth, and the whole body; if they start without a cause, especially in sleep.

**DEOBSTRUENTS**, in pharmacy, such medicines as are calculated to open obstructions.

**DEODAND**, a thing devoted or consecrated to God, in order to pacify his wrath, in case of any misfortune. Thus, if a beast kills a man, without the help of any reasonable creature, the beast becomes a deodand; that is, the creature is to be sold, and the price distributed to the poor.

**DEPART**, in chymistry, a method of refining or separating gold from silver, by means of aqua fortis, generally called quartation.

**DEPARTURE**, in law, signifies a departing or going from a plea given in bar of an action.

**DEPARTURE**, in navigation, is the easting or westing of a ship, with regard to the meridian it departed or sailed from; or it is the difference of longitude between the present meridian the ship is under, and that where the last reckoning or observation was made; and, in all places, except under the equator, it must be accounted according to the number of miles in a degree of the parallel the ship is in.

**DEPHLEGMATED**, an appellation given to spirits well freed from phlegm.

**DEPHLEGMATION**, in chymistry, the same as rectification, or the freeing a spirit from its phlegm, either by distillation, or some other means.

**DEPILATORY MEDICINES**, those applied in order to take off the hair: such are lime and orpiment known to be, but which ought to be used with great caution.

**DEPONENT**, in Latin grammar, a term applied to verbs which have active significations, but passive terminations or conjugations, and want one of their participles passive.

**DEPONENT**, in law, a person who makes a deposition.

**DEPOPULATION**, the act of committing waste.

**DEPOSITION**, in law, the testimony given in court by a witness upon oath.

**DEPRECATION**, in rhetoric, a figure whereby the orator invokes the aid and assistance of some one; or prays for some great evil or punishment to befall him who speaks falsely, either himself or his adversary.

**DEPRECATORY**, or **DEPRECATIVE**, in theology, a term applied to the manner of performing some ceremonies in the form of prayer.

**DEPRESSOR**, or **DEPRIMENS**, in anatomy, a name applied to several muscles, because they depress the parts they are fastened to.

**DEPRESSOR LABII SUPERIORIS**, or **TRIANGULARIS**, is a muscle that arises from the lower edge of the under jaw, between the masseter and quadratus, and ascends by the angle of the mouth to the upper jaw. These two muscles acting together, express a sorrowful countenance, because they draw downwards the corners of the mouth and cheeks.

**DEPRESSORES NASI**, a pair of muscles arising from the os maxillare, above the dentes incisores; and are inserted into the extremities of the alæ, which they pull downwards.

**DEPRESSORES OCULI**, a pair of muscles springing from each corner of the eye, and answered by another pair of the like figure and structure, in the lower eye-lid. See the article **EYE**.

**DEPRIVATION**, in the canon-law, the deposing a bishop, parson, vicar, &c. from his office and preferment.

**DEPTH**, in geometry, the same with altitude; though, strictly speaking, we only use the term depth to denote how much one body, or part of a body, is below another.

**DEPURATION**, in pharmacy, the same with clarification. See the article **CLARIFICATION**.

**DERELICTS**, in the civil law, are such goods as are wilfully thrown away and abandoned by the owner.

**DERELICT**, is also applied to such lands as the sea receding from, leaves dry and fit for cultivation.

**DERIVATION**, in physick, is when a humour, which cannot be conveniently evacuated at the part affected, is attracted thence, and discharged at some more proper place; or is drawn from a noble to a more ignoble part, where it is less capable of doing injury.

**DERIVATION**, in grammar, implies the affinity one word has with another, by being originally formed from it.

**DERIVATIVE**, in grammar, a word which is derived or formed from another.

**DERVIS**, or *Dervische*, generally signifies a poor man, in the Persian and Turkish languages, as professing poverty, especially the Mevalites, or Turkish dervises.

**DESCANT**, in musick, the art of composing in several parts, and is either plain, figurative, or double.

*Plain* **DESCANT**, is the ground-work and foundation of all musical compositions, consisting altogether in the orderly placing of many concords, answering to simple counterpoint. See **COUNTERPOINT**.

*Figurative*, or *Florid* **DESCANT**, is that part of an air of musick, wherein some discords are concerned, as well, though not so much, as concords. This may be termed the ornamental and rhetorical part of musick, in regard that there are introduced all the varieties of points, syncopes, diversities of measures, and whatever is capable of adorning the composition.

*Double* **DESCANT**, is when the parts are so contrived, that the treble, or any high part, may be made the bass; and, on the contrary, the bass the treble. See **HARMONY**, **COUNTER-POINT**, and **MELODY**.

**DESCENDANT**, in genealogy, a term relative to ascendant, and applied to a person who is born or issued from some other referred to: thus, mankind are said to be the descendants of Adam: and sometimes the descendants of Noah.

**DESCENSION**, in astronomy, is either right or oblique.

*Right* **DESCENSION**, is an arch of the equinoctial, intercepted between the next equinoctial point, and the intersection of the meridian, passing through the centre of the object, at its setting, in right sphere.

*Oblique* **DESCENSION**, an arch of the equinoctial, intercepted between the next equinoctial point and the horizon, passing through the centre of the object, at its setting, in an oblique sphere.

**DESCENSIONAL**, something belonging to descension. See the article **DESCENSION**.

**DESCENSIONAL DIFFERENCE**, that between the right



light and oblique descension of any heavenly body. See the article DESCENSION.

DESCENT, in general, is the tendency of a body from a higher to a lower place; thus all bodies, unless otherwise determined by a force superior to their gravity, descend towards the centre of the earth: the planets too may be said to descend from their aphelion to the perihelion of their orbits, as the moon does from the apogee to the perigee.

Heavy bodies, meeting with no resistance, descend with an uniformly accelerated motion; for the laws of which see the article ACCELERATION.

DESCENT, in genealogy, the order or succession of descendants in a line or family; or their distance from a common progenitor: thus we say, one descent, two descents, &c.

DESCENT, in heraldry, is used to express the coming down of any thing from above; as, a lion en descent, is a lion with his head towards the base points; and his heels towards one of the corners of the chief, as if he were leaping down from some high place.

DESCENTS, in fortification, are the holes, vaults, and hollow places made by undermining the ground.

The descent into the moat or ditch is a deep passage made through the esplanade and covert-way, in form of a trench, whereof the upper part is covered with madriers and clays, to secure the besiegers from the enemy's fire. In wet ditches this trench is on a level with the surface of the water, but in dry ones it is sunk as deep as the bottom of the ditch.

DESCRIBENT, in geometry, a line or surface, which, by moving parallel to itself, describes a surface or solid.

DESCRIPTION, is such a strong and beautiful representation of a thing, as gives the reader a distinct view and satisfactory notion of it.

DESERTER, in a military sense, a soldier who, by running away from his regiment or company, abandons the service.

DESHACHE, in heraldry, is where a beast has its limbs separated from its body, so that they still remain on the escutcheon, with only a small separation from their natural places.

DESIDERATUM is used to signify a desirable perfection in any art or science: thus, it is a desideratum with the blacksmith, to render iron fusible by a gentle heat, and yet preserve it hard enough for ordinary uses; with the glass-man and looking-glass maker, to render glass malleable; with the clock-maker, to bring pendulums to be useful, where there are irregular motions; and with the carvers and joiners, to fashion wood in moulds like plaster of Paris, or burnt alabaster, &c.

DESIGN, in a general sense, the plan, order, representation, or construction of a building, book, painting, &c.

In building, the term ichnography may be used, when by design is only meant the plan of a building, or a flat figure drawn on paper: when some side or face of the building is raised from the ground, we may use the term orthography; and when both front and sides are seen, in perspective, we may call it scenography.

DESIGN, in the manufactures, expresses the figures wherewith the workman enriches his stuff, or silk, and which he copies, after some painter, or eminent draughtsman, as in diaper, damask, and other flowered silk and tapestry, and the like.

DESIGN is also used, in painting, for the first idea of a large work, drawn roughly, and in little; with an intention to be executed and finished at large. The art of painting has been by some of the greatest masters divided into the design or draught, the proportion, the expression, the claro-obscuro, the ordonnance, the colouring, and the perspective.

DESIGNING, the art of delineating, as drawing the appearance of natural objects, by lines on a plane.

*Mechanical Method of DESIGNING.* There are several methods of designing mechanically. The following is that of the learned Sir Christopher Wren, and may be put in practice with the greatest ease:

A is a small sight with a short arm B (*plate XXVI.*

*fig. 13.*) which may be turned round about, and moved up and down the small cylinder CD, which is screwed into the piece ED; at D: this piece ED moving round about the centre E; by which means the sight may be removed either towards E or F.

EF is a ruler fastened on the two rulers GG; which rulers serve both to keep the square frame SSSS perpendicular, and, by their sliding through the square holes TT, they serve to stay the sight, either further from, or nearer to the said frame; on which frame is stuck on with a little wax the paper OOOO, whereon the picture is to be drawn by the pen I. This pen I is by a small brass handle V, so fixed to the ruler HH, that the point I may be kept very firm, so as always to touch the paper. HH is a ruler, that is always by means of the small strings aaa, bbb, moved horizontally, or parallel to itself; at the end of which is struck a small pin, whose head P is the sight, which is to be moved up and down on the outlines of any object.

The contrivance of the strings is this: the two strings aaa, bbb, are exactly of an equal length. Two ends of them are fastened into a small leaden weight which is moved in a socket on the backside of the frame, and serves exactly to counterpoise the ruler HH, being of equal weight with it. The other two ends of them are fastened to two small pins HH, after they have rolled about the small pulleys MM, LL, KK; by means of which pulleys, if the pen I be taken hold of, and moved up and down the paper, the strings moving very easily, the ruler will always remain in an horizontal position.

The manner of using it is this: set the instrument upon a table, and the sight A, at what height above the table, and at what distance from the frame SSSS you please: then looking through the sight A, and holding the pen I in your hand, move the head of the pin P up and down the outlines of the object, and the point I will describe, on the paper OOOO, the shape of the object so traced.

DESPOT, a title given to the princes of Walachia, Servia, and some of the neighbouring countries.

DESPOTISM, or *Despotic Government*, a form of government wherein the prince is arbitrary and absolute, acting according to the dictates of his own will, without being controuled by any other power.

DESPOUILLE, in heraldry, is the whole skin or flough of a beast, with the head, feet, tail, and all appurtenances; so that, being filled and stuffed, it looks like an entire creature.

DESPUMATION, in pharmacy, is the clearing and cleansing of any liquor, by long boiling and continual skimming it.

DESEQUAMATION, in surgery, is the cleansing carious bones that flake off like scales.

DESSICCATIVE, or *Desiccative*, in pharmacy, an epithet applied to such topical medicines as dry up the humours flowing to a wound or ulcer.

DESUDATION, a profuse and inordinate sweat, succeeded by an eruption of pustules called sudamina.

DETACHED *Pieces*, in fortification, are such outworks as are detached, or at a distance from the body of the place.

DETACHMENT, in military affairs, is a certain number of soldiers taken out of a greater body, in order to be employed in some particular enterprize, to form a kind of flying camp, to relieve a party already engaged in battle, to join a separate army, to assist at the siege of a place, to enter into some garrison, &c.

DETENTS, in a clock, are those stops, which by being lifted up or let fall down, lock and unlock the clock in striking.

DETERGENT, in physick, are such medicines as are not only softening and adhesive, but also by a peculiar activity, conjoined with a suitable configuration of parts, are apt to abrade and carry along with them such particles as they lay hold on in their passage.

DETINUE, in law, a writ or action lying against a person, who detains goods delivered him to keep.

DETONATION, in chymistry, the noise and explosion which any substance makes upon the application of fire to it. It is also called Fulmination.

DETRA-



**DETRAHENS QUADRATUS**, in anatomy, a muscle otherwise called *platysma*. See **PLATYSMA**.

**DETRANCHE**, in heraldry, a line bendwise, proceeding always from the dexter side, but not from the very angle, diagonally athwart the shield.

**DEVONSHRING**, or **DENSHRING**, a term used in many parts of England for burning of land. See the article **BURN-BAKING**.

**DEVIATION**, in the old astronomy, a circle invented to account for the excentricity and difference in the distance of the planets when in apogee or perigee.

In the Ptolemaick system, it is called the diviation of the epicycle.

**DEVIL**, *διαβολος*, an evil angel, one of those celestial spirits cast down from heaven, for pretending to equal himself with God.

**DEVISE**, or **DEVICE**, in heraldry, painting, and sculpture, an emblem used to represent a certain person, action or quality; with a suitable motto, applied in a figurative sense. See **MOTTO**.

The essence of a devise consists in the metaphorical similitude between things representing and represented.

**DEVISE** is frequently also used for a cypher.

**DEVISE**, in law, the act whereby a person bequeaths his lands or tenements to another, by his last will and testament.

**DEUTERONOMY**, a canonical book of the Old Testament, and the last of the five books of Moses.

**DEW**, a moist dense vapour, which rises from the earth, and being condensed in the atmosphere, falls again in the form of a misting rain, while the sun is below the horizon.

**DEW-BORN**, in country affairs, a distemper in cattle, being a swelling in the body, as much as the skin can hold, so that some beasts are in danger of bursting. This distemper proceeds from the greediness of a beast to feed, when put into a rank pasture; but commonly when the grass is full of water. In this case the beast should be stirred up and down, and made to purge well: but the proper cure is bleeding in the tail; then take a grated nutmeg, with an egg, and breaking the top of the shell, put out so much of the white as you may have room to slip the nutmeg into the shell; mix them together, and then let shell and all be put down the beast's throat; that done, walk him up and down, and he shall soon mend.

**DEXTER**, in heraldry, an appellation given to whatever belongs to the right side of a shield, or coat of arms: thus we say, bend-dexter, dexter-point, &c.

**DEXTROCHERE**, or **DESTROCHERE**, in heraldry, is applied to the right arm painted in a shield, sometimes naked, sometimes clothed, or adorned with a bracelet; and sometimes armed, or holding some moveable or member used in the arms.

**DEY**, in matters of government, the sovereign prince of Algiers, answering to the bey of Tunis.

**DIABETES**, from *διαβαινω*, to pass off, in physick, that discharge of urine, when any liquor, soon after is drank, is immoderately, and without undergoing almost any change, evacuated crude, and under the appearance of water.

In this disorder the patient is continually afflicted with an insatiable thirst, that cannot be removed by drinking the most liberal draughts. The liquor drank is often discharged by urine, in larger quantities than it was taken into the stomach. Thus the whole body is, by this means, consumed, and as it were dissolved; though, in some patients, the loins, the thighs, the testes, and especially the feet, become a little turgid, and a certain heat is perceived in the intestines.

A diabetes is a disease of the chronical kind, and depends upon the state of the kidneys: when recent, it sometimes admits of a cure; but when inveterate, and of long standing, it becomes incurable.

**DIACAUSTICK Curve**, in geometry, a curve supposed to be generated in the following manner:

When the rays that issue from a radiating point are refracted by a given curve, so that the sine of the angle contained between that refracted ray and the perpendicular to the curve, is always to the sine of the angle, con-

tinued between the incident ray and that perpendicular in one constant ratio; the curve that touches all the refracted rays is called the diacaustick, curve, or caustick by refraction.

**DIACELTATESSON**, in chymistry, a name given by Van Helmont to a purging preparation procured from the fixed flowers of antimony.

**DIACENTROS**, a term used by Kepler for the lesser diameter of a planet's orbit.

**DIACHALCITIS**, in surgery and pharmacy, a plaster composed of oil, axungia and chalcitis, which formerly used to be applied after the amputation of a cancer, and on many other occasions.

**DIACHAYLON**, in pharmacy, an emollient digest-plaster, composed of the mucilages or juices of certain herbs, litharge and oil.

**DIACODIUM**, in pharmacy, a sirup prepared from the heads of poppies.

The word is formed from the Greek, *δια* and *ωιδειν*, a poppy-head.

**DIACOUSTICKS**, or **DIAPHONICKS**, is the doctrine or consideration of the properties of sound, refracted in passing through different mediums; that is, out of a dense into a more rare, or out of a rare into a denser medium.

**DIADELPHIA**, the name of the seventeenth class in the Linnæan system of botany, and comprehends all such plants as bear hermaphrodite and papilionaceous flowers, and leguminous seed vessels.

The distinguishing characteristick of this class, is that the corolla is unequal, and the petals are expressed by distinct names.

The filaments form two dissimilar bodies: the lower one that involves the pistil; and the upper one incumbent on it: the former of these, from the middle downwards, is cylindraceous, membranaceous, and split lengthways on its upper side; but the upper half terminates in nine subulated parts, that are of the same length with, and follow the flexure of the carina of the corolla; and of which the intermediate or lower radii are longer by alternate pairs. The upper filament is single and awl-shaped, and covers the slit of the cylindraceous part of the under one. The antheræ, reckoned together, are ten in number; one on the upper filament, and nine on the under. To this may be added, that the pistil is single, growing out of the receptacle within the calyx. The germen is oblong, roundish, and lightly compressed. The style is subulate, filiform, and ascending, of the same length and position of the radii of the filament; and the stigma is downy the length of the style from the part, turned upwards, and immediately below the antheræ.

This class is the most natural; the leaves are food for cattle, and the seeds for tame quadrupeds; and comprehends peas, beans, vetches, and a number of other genera.

**DIADEM**, in antiquity, a head-band, or fillet worn by kings, as a badge of their royalty.

**DIADEM**, in heraldry, is applied to certain circles, or rims, serving to inclose the crowns of sovereign princes, and to bear the globe and cross, or the fleur-de-luces, for their crest.

**DIÆRESIS**, in surgery, an operation serving to divide and separate the part, when the continuity is a hindrance to the cure. Some professors divide surgery into six parts, assigning to each Greek names, of which diæresis is one.

**DIÆRESIS**, in medicine, is the consuming of the vessels of an animal body, when from some corroding cause certain passages are made, which naturally ought to have been; or certain natural passages are dilated beyond their ordinary dimensions, so that the humours which ought to have been contained in the vessels, extravasate or run out.

**DIÆRESIS**, in grammar, the division of one syllable into two, which is usually noted by two points over a letter, as *aulai* instead of *aulæ*, *dissoiulenda* for *dissoiuvenda*.

**DIAGLYPHICK**, the art of cutting or engraving figures on metals; such as seals, intaglios, matrices of letters, &c. or coins for medals.

**DIAGNOS-**



**DIAGNOSTICK**, that judgement of a disease that is taken from the present symptoms and condition of the patient.

**DIAGONAL**, in geometry, a right-line drawn across a parallelogram, or other quadrilateral figure, from the vertex of one angle to that of another. Thus, the right-line *ab* (*plate XXVI. fig. 9.*) is the diagonal of the parallelogram *acbd*.

If another be drawn as *cd*, it will cut the parallelogram in the point *e*, the centre of the parallelogram.

**DIAGRAM**, in geometry, a scheme or figure drawn in order to explain or demonstrate its properties.

**DIAGRADIUM**, in pharmacy, a preparation of scamony, consisting in baking it in a quince, which renders its operation much milder than before.

**DIAL**, or **SUN-DIAL**, an instrument calculated to measure time by means of the shadow of the sun.

Sun-dials are differently denominated, according to their different situation, and the figure of the surfaces whereon they are described; as, horizontal, vertical, equinoctial, polar, direct, erect, declining, inclining, reclining, cylindrical, &c.

As no art or science can be thoroughly understood, without being well acquainted with the principles on which it is founded, we shall first explain the philosophical principles of dialling, before we proceed to the particular kinds of dials above-mentioned.

Since the time which passes between the Sun's leaving any meridian and returning to it again is divided into 24 hours, so, if we conceive a sphere to be constructed with 24 of these meridians, the sun will be in one of them at the beginning of every hour. Such a sphere may be represented by *PDSB* (*plate XXVII. fig. 1.*) where the several meridians are represented *P1S*, *P2S*, *P3S*, and so on to twice 12 or 24 in all.

Since these meridians divide the equinoctial into 24 equal parts, each part will contain just  $15^\circ$ , because  $15 \times 24 = 360^\circ$  = the whole circle; and since all the meridians pass through the poles of the world, the planes of those meridians all intersect each other in one common line *PS*, which is the axis of the sphere; therefore the said axis *PS* is in the plane of each of the 12 meridians.

Suppose *Z* to be the zenith of any place, as London, and *DWBE* the plane of the horizon fixed within the sphere, constructed with the said 12 meridians or hour-circles, 1, 1, 2, 2, 3, 3, 4, 4, &c. then will the axis of the sphere *PS* pass through the centre of the plane at *N*, so that one half *NP* will be above the plane, and the other half *NS* below it.

Suppose now this dialling-sphere to be suspended by the point *Z*, and moved about so as to have the points *D* and *B* exactly in the south and north points of the horizon, and *E* and *W* in the East and West points; then will the sphere have a situation every way similar to that of the earth and heavens with respect to the given place, London, and the axis of the sphere to that of the earth.

Therefore, the sun shining on such a sphere, will be attended with all the same incidents, and produce all the same effects as would happen if the said sphere were at the centre of the earth; or the centre *N* of the sphere coincided with the centre of the earth; because the distance betwixt the surface and centre of the earth is insensible at the sun.

Now it is evident, as the sun revolves about such a sphere, it will every hour be upon one half or other of the twelve hour circles, viz. from midnight to noon it will be on those parts of the circles which are in the eastern hemisphere, and from noon to midnight it will pass over all those in the western. It is also further evident, that while the sun is in the eastern hemisphere, it will be first below, and then above the plane of the horizon, and vice versa, on the other side.

Again, when the sun is upon any one of these circles by shining upon the axis, it causes it to cast a shadow on the contrary side, on the plane of the horizon, on the lower and upper surface, as it is below or above the said plane. This shadow of the axis will be precisely in the line in which the plane of the hour circle will intersect the plane of the horizon: if therefore lines were drawn through the centre *N*, joining the points

on each side the plane, where the hour-circles touch it, as 4 *N* 4, 5 *N* 5, 6 *N* 6, &c. the shadow of the axis will fall upon those lines at the beginning of each respective hour, and thereby indicate the hour-circle the sun is in for every hour of the day.

These lines are therefore properly called hour-lines; and, among the rest, that which represents the hour of 12 at noon is *NB*, half the meridian line *DB*; whence it appears that the hour-lines *N1*, *N2*, *N3*, &c. which serve for the afternoon, lie on the east side of the plane, and are numbered from the *N*. to the *E*. and on the contrary.

It also appears, that as the sun's altitude above the plane is greater or less, the number of hour-circles the sun will possess above the horizontal plane will be also greater or less. Thus when the sun is at *S* in the equinoctial, its diurnal path for that day being the equinoctial circle itself *AEQW*, it is plain, since the arch *AE = EQ*, the sun will apply to six hour-circles below the horizon, and to six above it, in each half of the day; and consequently, that on that day the shadow will occupy but 12 of the hour lines on each surface of the plane, beginning and ending at 6.

But when the sun is in the tropick of Cancer, its diurnal path, for that day, being the tropick itself *TCRF*, it is manifest the sun in the afternoon ascends above the plane in passing between the hour-circles of 3 and 4 in the morning, and descends below it in the afternoon, between the hours of 8 and 9: therefore, on the summer-tropick, the shadow will pass over 16 of those hour-lines; and, vice versa, when the sun is in the winter tropick at *O*, its path being then *OGIH*, it rises above the plane between 8 and 9, and leaves it between 3 and 4.

From what has been said, it is evident, that if the circles be supposed removed, and only the horizontal plane remain, with the half of the axis *NP* above it, the same position as before, then should we have constituted an horizontal dial, every way the same with those in common use, as represented (*plate XXVII. fig. 2.*) with only the addition of a substyle *PO*, to render the style *NP* very firm.

Hence appears the reason why the gnomon or style *NP*, in those dials in our latitude, is always directed to the north pole, and always contains such an angle *PNO*, with the hour of 12 line, *NB*, as is equal to the latitude of the place. Lastly, the reason appears why the number of hour-lines on these dials exceeds not 16, and are all drawn from 6 to 12 and 6 again, on the northern part, the rest on the southern; and why the hour-line of 6 lies directly *E*. and *W*. as that of 12 does *N*. and *S*. If a plane be fixed within the same sphere in a vertical position, or perpendicular to the horizon, and coinciding with the plane of the prime vertical, that is, facing full *S*. and *N*. then will the axis *PS* (*fig. 3.*) still pass through the centre of the plane *N*; and the lower semi-axis *NS* will by its shadow mark out the hour-lines on the southern surface, and the upper semi-axis *NP* will do the same on the northern. These hour-lines are determined in the same manner as those on the horizontal dial; and it is plain the sun cannot come on the southern face of this plane before six in the morning, nor shine on it after six in the evening. It is also evident, that all the hours before 6 in the morning, and after 6 at night, will be shewn on the northern face or side of this plane, for the time of the sun's being above the horizon in any place. Hence the reason of a direct *S*. and *N*. vertical dial easily appears; the latter of which is represented (*plate XXVII. fig. 4.*) apart from the sphere; with its style *NS*, substyle and hour-lines; and the same may be conceived for a north erect dial.

The gnomon *NS* (*plate XXVII. fig. 3.*) contains an angle *SNF = ZNP* with the meridian or hour-line of 12, viz. *ZF*, which is exactly the complement of *PNB* to  $90^\circ$ ; hence the elevation of the gnomon in vertical dials is equal to the complement of the latitude of the place. The principles of a direct south dial being understood, it will be easy to understand those of a dial which does not face the *S*. or *N*. directly, but declines there from any number of degrees from *E*. to *W*.



Having thus explained the principles on which the whole art of constructing dials is founded, we shall now proceed to shew the methods generally used in drawing the hour-lines, &c. upon the most useful sorts of dials.

*Equinoctial DIAL*, is that described on an equinoctial plane, or a plane representing that of the equinoctial. They are usually distinguished into upper, which look towards the zenith, and lower which respect the nadir. Now as the sun only illumines the upper surface of an equinoctial plane, while he is in our hemisphere, or on the northern side of the equator, an upper equinoctial dial will only shew the hour during the spring and summer season. And again, as the sun only illumines the lower surface of an equinoctial plane, while he is in the southern hemisphere, or on the other side of the equator, a lower equinoctial dial will only shew the hour in autumn and winter. To have an equinoctial dial therefore that shall serve all the year round, the upper and lower must be joined together; that is, it must be drawn on each side of the plane.

*To describe an upper equinoctial DIAL.* From a centre C (plate XXIX. fig. 1.) describe a circle ABDE, and by two diameters AD and BE, intersecting each other at right angles, divide it into quadrants AB, BD, DE and EA. Subdivide each quadrant into six equal parts by the right-lines. C<sub>I</sub>, C<sub>II</sub>, C<sub>III</sub>, &c. which lines will be hour lines, and through the centre C drive a style or pin perpendicular to the plane ABDE. The dial thus described being raised so as to be in the plane of the equator, the line C<sub>III</sub>, in the plane of the meridian, and the point A looking towards the south; the shadow of the style will shew the hours both of the forenoon and afternoon.

*A lower equinoctial DIAL* is described in the same manner, with this exception, that no hour lines are to be drawn beyond that of six o'clock.

*To describe an universal equinoctial DIAL:* join two metal planes ABCD and CDEF, (fig. 2.) so as to be moveable at the joint. On the upper surface of the plane ABCD describe an upper equinoctial dial; and upon the lower, a lower, as already directed, and through the centre I drive a style. In the plane DEFC cut a box, and put a magnetical needle G therein; fit on the same plane a brass quadrant LH, nicely graduated, and passing through a hole H cut in the plane ABCD. Now since this may be so placed by means of the needle, as that the line I 12 shall be in the plane of the meridian, and by means of the quadrant so raised, as that the angle BCF shall be equal to the elevation of the equator, it will serve as a dial in any part of the world. On this dial may be drawn several concentrick circles, which will shew the sun's place and declination. Thus divide the style into an hundred parts, which being the radius of a circle, take the complement of the declination 5°, 10°, 15°, &c. and with the tangent of these degrees describe concentrick circles, and when the end of the shadow of the style comes into one of them, it shews the declination and the sun's place, which may be marked on the circles.

*Horizontal DIAL*, that described on a plane parallel to the horizon.

*To draw the Hour Lines upon an horizontal DIAL*, geometrically, draw a right-line NS (fig. 3.) for the meridian and hour line of 12, and cross it with another EW. for the hour line of 6 at right angles in Z: and upon Z as a centre describe a circle ENWS. representing the horizon, of London for example, whose latitude is 51° 32', and likewise this dial plane. Within this circle project the sphere according to your latitude: then shall the several hour circles touching the plane of the horizon give you points to draw the hour lines upon your dial plane. If a ruler therefore is laid to Z; and every one of the points 1, 2, 3, &c. 11, 10, 9, &c. and straight lines drawn, these lines shall be the true hour lines for your horizontal dial. There is nothing required to compleat this dial but to make the height of the style equal to the latitude of the place. Wherefore for the latitude of London take 51° 32' from your scale of chords, and set them upon the horizon from S to A, and draw a line ZA for the style. The substyle, upon which the style stands in all horizontal dials, is the meridian, or hour line of 12.

In large dials, where great accuracy is required, it is best to determine the lines of the dial by trigonometrical calculation, in which the elevation of the pole of the place being given, the angles which the hour lines make with the meridian in the centre of the dial are found by the following canon. As the sine of 90°, is to the sine of the elevation of the pole or latitude of the place; so is the tangent of each hour's equinoctial distance from the meridian, to the tangent of the angle required.

*Vertical DIAL*, that drawn on the plane of a vertical circle. The verticals chiefly used are the prime vertical and the meridian, whence arise S. N. E. W. dials. If the dial respects the cardinal points of the horizon, it is called direct, but if any other vertical be chosen, it is said to decline. Again, if the circle whose plane is used be perpendicular to the horizon, the dial is denominated erect; but if the plane be oblique to the horizon, it is said to incline or recline.

*Erect, direct, south or north DIAL*, is that described on the surface of the prime vertical circle, looking southward or northward.

*To describe the Hour Lines upon a vertical erect, direct, south or north DIAL.* Having drawn a right-line NS (fig. 4 and 5.) for the meridian, or line of 12, and another at right angles EW. for the horizontal line of the plane, crossing in the point Z; upon Z as a centre, describe a circle NESW representing the horizon, and thereon project the sphere. Then draw a line upon your projection to represent your plane. Now an erect direct plane, which beholds the south, must needs be in the azimuth circle of E. and W. and therefore a right line drawn from E. to W. shall represent your plane. Having drawn the plane upon the projection, you must find its pole. Now, this plane EW lying in the azimuth of E. and W. its poles must lie in the azimuth of N. and S. so that N is the pole of the north face of this plane, and S of the south face, either of which poles are removed 90° from the plane, and a line drawn from the one pole to the other, will cut the plane at right angles in Z. The next thing to be found is the elevation of the pole of the world above the plane. Now P the pole of the world is elevated above this plane EW the quantity of the arch of the meridian ZP. To find the quantity of which, take the distance ZP in your compasses, and measure it upon the scale of half tangents, and you will find it to be equal to the complement of the latitude. Then as for the hour distances upon the plane, they are found thus: Lay a ruler to N, the pole of the plane, and to the several points 1, 2, 3, &c. 11, 10, 9, &c. where the hour circles of the projection cut the plane, and where the ruler cuts the primitive circle make small \*\*\*: and lines drawn from the centre Z, through these stars, shall be the true hour lines upon the dial plane. The height of the pole above the plane being equal to the complement of the latitude, take that in degrees from a scale of chords and set them from S to B, and draw a line ZB for the style, which must stand upon the meridian, and on the south face must point downwards to the south pole, and on the north face upwards to the north pole, as in No. 5.

To draw this dial trigonometrically, say, as the radius to the co-sine of the latitude; so is the tangent of 15° the first hour's equinoctial distance, to the tangent of the first hour's distance on the plane.

*Erect, direct, east or west DIAL*, that described on the plane of the meridian, looking to the east or to the west.

*To describe an erect, direct, east or west DIAL.* Let ABCD (plate XXIX. fig. 6 and 7.) be the dial-plane. 1. Upon the point C at the lowermost corner, if it be an east dial, or upon the point D, at the other lowermost corner, if it be a west dial, with sixty degrees of a line of chords, describe an obscure arch of a circle EF. Then from the same line of chords take the complement of the latitude of the place, which is also the elevation of the equinoctial above the horizon; and set that distance upon the arch from E to F, and draw the line CFA quite through the plane. This line will represent the equinoctial circle. 2. That you may the better proportion your style to your plane, and that all the hours may come on, and be at a convenient distance



tance from one another, assume two points in the equinoctial line, one towards the end of C for the hour of XI, in the east dial, or of I in the west dial, as the point G; and another towards the other end thereof, for the hour of VI, as the point H; and through these two points G and H, draw two lines at right angles to the equinoctial for the hour lines of XI and VI o'clock. 3. Upon the point G with  $60^\circ$  of the line of chords, describe an obscure arch of a circle, below the equinoctial line, as I K, setting thereon  $15^\circ$  of your line of chords from I to K, and draw the obscure line G K L extending it till it cut the hour line of VI in the point L; so shall the distance L H be the height of the perpendicular style proportioned to this plane. 4. Open your compasses to  $60^\circ$  of your line of chords, and setting one foot in the point L, with the other describe an obscure arch of a circle M N between the hour line of VI and the line G L. 5. Divide the arch M N into five equal parts, at the points  $\odot \odot \odot \odot \odot$ , and lay a ruler from L to each of these points, and the ruler will cut the equinoctial line C H in the points \* \* \*, through which points draw right lines parallel to the hour line of VI, as the lines VII\*VII, VIII\*VIII, IX\*IX, X\*X, and they will be the true hour lines of an east dial from six in the morning to eleven before noon. 6. For the hour lines before VI, namely, of IV and V in the morning, you may put them on by transferring the same distances upon the equinoctial line before VI, as there is between VI, and the hour lines of VII and VIII, after VI. and through these points draw lines parallel to the hour line of VI, and they will be the hour lines of IV and V in the morning. 7. For the style of E. or W. dials it may be either a straight pointed pin or wire exactly of the length of the line H L, fixed in the point H, or some other part of the line of VI, perpendicularly to the plane, which will shew the true hour only by the shadow of the very top, as in the west dial (fig. 7.) or, which is better, it may be a plate of brass of the same breadth with the distance between the hour lines of VI, and IX upon the equinoctial, as in the east dial (fig. 6.) which plate being set perpendicularly upon the hour line of VI, will shew the hour by the shadow of the upper edge. 8. If you would insert the halves and quarters of hours, divide each space between  $\odot$  and  $\odot$  on the arch M N into four equal parts, and so transfer them to the equinoctial circle, as you did the whole hours. In an east and west dial every thing is the same, with this difference only, that whereas the arch E F in the east dial, through which the equinoctial passes, was described on the right hand of the plane upon the centre C; in the west dial it must be described on the left hand on the centre D; and the hour lines of IV, V, VI, VII, VIII, IX, X, XI in the forenoon on the east dial, must be VIII, VII, VI, V, IV, III, II, I in the afternoon on the west dial.

*Polar DIAL*, that described on a plane passing through the poles of the world, and the E. and W. points of the horizon, denominated upper or lower, according as it looks up towards the zenith, or down towards the nadir. It is therefore inclined to the horizon in an angle equal to the elevation of the pole.

*Secondary DIAL*, that drawn on the plane of other circles than the horizon, prime vertical, equinoctial, and polar circles; or that which either declines, inclines, reclines, or deinclines.

*Declining DIALS* are erect or vertical dials, which cut either the plane of the prime vertical, or of the horizon at oblique angles. They are of a very great use, as the walls of houses, upon which dials are frequently drawn, commonly deviate from the cardinal points.

To describe a vertical DIAL, declining from the South to the East, or West, trigonometrically. In order to do this, 1. The height of the pole or style above the plane must be found. 2. The deflexion or substyle's distance from the meridian. And 3. The plane's difference of longitude. All which are parts of the spherical triangle P R Z, (plate XXIX. fig. 8.) right angled at R, in which are given the side P Z, equal to the complement of the latitude of the place; the angle P Z R, the complement of the plane's declination, and the right angle at R. From

these three data are found, 1. The height of the style above the plane by this canon.

As the sign of  $90^\circ$

Is to the sine complement of the latitude;

So is the sine complement of the plane's declination

To the sine of the height of the style.

2. The distance of the substyle from the meridian by this canon.

As to the sine of  $90^\circ$

To the sine of the plane's declination,

So is the tangent of the complement of the latitude of the place

To the tangent of the substyle's distance from the meridian.

3. To find the plane's difference of longitude, say,

As the sine of the complement of latitude

To the sine of  $90^\circ$ ,

So is the sine of the substyle's distance from the meridian

To the sine of the plane's difference of longitude.

4. To find the angle that each hour makes with the substyle, say,

As the sine of  $90^\circ$

To the sine of the height of the pole above the plane.

So is the tangent of the difference of the sun's distance from the meridian and the difference of longitudes

To the tangent of the angle required.

An example of a north dial declining east, which is only a south dial inverted, may be seen in plate XXIX. fig. 9.

*Inclined DIALS* are those delineated on planes inclining towards the southern side of the horizon in an angle either greater or less than the equinoctial plane.

*Ring-DIAL*, a kind of dial, consisting of a brass ring, seldom exceeding two inches in diameter, and one third of an inch in breadth. In a point of this ring there is a hole, through which the sun-beams being received, make a lucid speck on the concavity of the opposite semicircle, which gives the hour of the day in the division marked therein. But it only holds good about the times of the equinox, unless the hole is made moveable, and the days of the month are marked on the convex side of the ring. In this case the dial can be rectified for any time, and will shew the hour of the day throughout the year.

To use it, put the moveable hole to the day of the month, then suspending it by the little ring, turn it towards the sun till his rays point out the hour among the divisions on in the inside.

*Universal or astronomical Ring-DIAL*, a dial serving to shew the hour of the day in any part of the earth; whereas the former is confined to a certain latitude. It is composed of two rings, or flat circles, from two to six inches in diameter, and their breadth proportional. The outward ring H R E P, (plate XXVII. fig. 5.) represents the meridian of the place of the observer, and contains two divisions of  $90^\circ$  each, as H R and E P diametrically opposite to each other, the one serving from the equator to the north pole, and the other from the equator to the south. The inner ring B C represents the equator, and turns exactly within the outward ring, by means of two pivots at the points of the hours of 12. A cursor N composed of two little pieces, slides along an aperture, in the middle of the bridge I, which cursor has a small hole to admit the rays of the sun. The middle of this bridge represents the axis of the world, and its two extremities, the two poles; on one side of it are drawn the signs of the zodiack, and on the other the days of the month. On the edge of the meridian slides a piece b a, with a ring I fitted to it, by which the instrument is to be suspended during the observation. This ring represents the zenith.

*Use of the Universal-Ring-DIAL*. Place the line on the middle of the sliding-piece, immediately below the ring, to the latitude of the place, and fix the line crossing the hole of the cursor to the day of the month, or degree of the sign in which the sun then is. Open the instrument so, that the two rings be at the right angles to each other, and suspend it by the ring I: turn the flat side of the bridge towards the sun, so that his rays coming through the little hole in the middle of the cursor, fall exactly on

a line



a line drawn round the middle of the concave surface of the interior ring, where it will point out the hour. Let it be observed, however, that this dial will not shew the hour of 12, because the outer circle being then in the plane of the meridian, hinders the sun's rays from falling on the inner. Neither will it shew the hour when the sun is in the equinoctial, for then his rays fall parallel to the plane of the inner circle.

*Reflecting DIAL*, a sort of dial shewing the hour of the day by means of a thin piece of looking-glass plate, so placed as to reflect the sun's rays on the top of a ceiling, where the hour-lines are drawn.

*Lunar, or Moon-DIAL*, shews the hour of the night by means of the shadow of the moon, projected from an index.

*DIALS without Centres*, those whose hour-lines converge so slowly, that the centre they converge towards cannot be expressed on the given plane. Horizontal dials of this kind are to be made for places, the elevation of whose pole is either very great or very small; and vertical dials without centres are for places which have the pole very much elevated.

*DIALECT*, an appellation given to the language of a province, so far as it differs from that of the whole kingdom. The term, however, is more particularly used in speaking of the ancient Greek, whereof there were four dialects, the Attick, Ionick, Æolick, and Dorick, each of which was a perfect language in its kind, that took place in certain counties, and had peculiar beauties.

In Great-Britain, besides the grand diversity of English and Scotch, almost every county has a dialect of its own, all differing considerably in pronunciation, accent and tone, although one and the same language.

*DIALECTICKS*, *Dialectica*, in the literary history of the ancients, that branch of logicks which taught the rules and modes of reasoning.

*DIALLING*, the art of constructing all manner of dials. See the article *DIAL*.

*DIALLING-GLOBE*, an instrument of brass or wood, with a plane fitted to the horizon, and an index so contrived as to give a clear illustration of the art of dialling.

*DIALLING-SCALES*, rulers with lines graduated on them, to facilitate the construction of dials.

*DIALOGISM*, in rhetoric, implies the soliloquy of a person speaking to themselves.

*DIALYSIS*, in grammar, a mark or character consisting of two points (· ·) placed over two vowels in a word, to separate them, as they would otherwise form a diphthong, as *Mosaïck*, &c.

*DIAMETER of a Circle*, in geometry, is a right-line passing through the centre of the circle, and terminated both ways by the circumference.

For the method of finding the ratio of the diameter to the circumference of a circle. See *CIRCLE*.

*DIAMETER of a Curve*, is a right-line, as *AC* (*plate XXVI. fig. 15.*) that bisects the right-lines *D E*, *D E*, drawn parallel to one another: and are either of a finite or infinite length.

Though a right-line, bisecting all parallel lines drawn from one point of a curve to another, is taken in a strict sense only for the diameter of a curve line, yet it may not be amiss more generally to define a diameter, in saying, that it is that line, whether right or curve, which bisects all the parallels drawn from one point to another of a curve; so that, according to this, every curve will have a diameter: and thence Sir Isaac Newton's curves of the second order have all either a right-lined diameter, or else the curves of some one of the conick sections for diameters: and many geometrical curves of the higher orders may also have for diameters curves of more inferior ones, and that ad infinitum.

*DIAMETER of Gravity*, in any surface or solid, is that line in which the centre of gravity is placed.

*DIAMETER of a Sphere or Globe*, is a right-line drawn through the centre, and terminated at each end by the surface of the sphere or globe.

*DIAMETER of a Column*, is its thickness just above the base. From this the module is taken which measures all the other parts of the column.

*DIAMOND*, *Adamas*, in natural history, a genus of precious stones, of a fine pellucid substance, of great hardness, never fouled by any admixture of earthy or any other coarse matter, susceptible of elegant tinges from metalline particles, giving fire with steel, not fermenting with acid menstruums, scarcely calcinable by any degree of fire, and of one simple and permanent appearance in all lights.

This is the most valuable and hardest of all gems; and, though found of different shapes, and sometimes accidentally tinged to several colours, yet ever carries the same distinguishing characters, and is very evidently in all those states the same body. It is, when pure, perfectly clear and pellucid as the purest water, and is eminently distinguished from all other substances, by its vivid splendor, and the brightness of its reflections. It is extremely various in shape and size, being found in the greatest quantity very small, and the larger ones extremely seldom met with; the largest diamond certainly known ever to have been found is that in the possession of the Great Mogul, which weighs 279 carats, and is computed to be worth 779,244*l*.

The places whence we have the diamonds are the *E. Indies*, in the island of Bornea, and in the kingdoms of *Visapour*, *Golconda*, *Bengal*, and the *Brasils* in the *W. Indies*. They are not unfrequently found yellowish, bluish, and reddish, but more rarely greenish.

There have not been wanting people who have attributed to the diamond great virtues as a cordial; but we are apt to believe no body ever did, or will, try whether this has been said with any sort of foundation.

*Valuation of DIAMONDS*, among jewellers, is thus calculated: they suppose the value of a rough diamond to be 2*l*. per carat; then to find the value of those of greater weight, they multiply the square of their weight by 2, and this last product is the value of the diamonds in their rough state: thus, the value of a rough diamond weighing 4 carats, is equal  $4 \times 4 = 16 \times 2 = 32$  *l*. and so in other cases. Again, to find the value of wrought diamonds, they suppose half their weight lost in manufacturing them, and therefore multiply the square of double their weight by 2; thus the value of a wrought diamond, weighing 3 carats, is equal  $6 \times 6 = 36 \times 2 = 72$  *l*.

*Cornish DIAMOND*, in natural history, a name given to a kind of crystals, from their being found in Cornwall. See the article *CRYSTAL*.

*Rough DIAMOND*, is the stone as nature produces it in the mines.

*Rose DIAMOND*, is that quite flat underneath, with its upper part cut in divers little faces, usually triangles, the uppermost of which terminate in a point.

*Table DIAMOND*, is that which has a large square face at top, encompassed with four less ones.

*Brilliant DIAMOND*, is that cut in faces both at top and bottom; and whose table, or principal face at top, is flat.

*DIAMOND*, in the glass trade, an instrument used for squaring the large plates or pieces; and among glaziers, for cutting their glass.

*DIAMOND*, in heraldry, a term used by some writers, to express the black colour in the achievements of peers.

*DIANDRIA*, the name of the second class in the Linnæan system of botany, and comprehends all such plants as bear hermaphrodite flowers, furnished with two stamina in each; of this class are the jacinthe, phillyrea, lilack, olive, sage, rosemary, with several other genera.

*DIANTHERA*, in botany, a genus of plants whose corolla consists of a single ringent petal with two filaments topped with twin antheræ; the fruit is a bivalvular capsule, with two cells, each containing a solitary lentiform seed.

*DIANTHUS*, in botany, a genus of the decandrigynæa class of plants, whose corolla consists of five petals, the ungues of which are the length of the cup; they are narrow, and inserted into the receptacle; the limb is plane; and the bractæ of the petals broadest at the extremity, and crenated; the fruit is a cylindrick covered capsule, consisting of one cell, and opening four



four ways at the top; the seeds are numerous, compressed, and roundish.

This genus comprehends the clove-july-flowers or carnations, the pinks and sweet-williams; all beautiful flowers, which may be propagated by seeds or layers.

DIAPASMA, in pharmacy, a name for all powders sprinkled on the body, whether as perfumes or otherwise.

DIAPASON, in musick, a musical interval, by which most authors, who have wrote upon the theory of musick, use to express the octave of the Greeks.

DIAPASON, among the musical instrument-makers, a kind of rule or scale, whereby they adjust the pipes of their organs, and cut the holes in their flutes, haut-boys, &c. in due proportion, for performing the tones, semi-tones, and concords just.

The bell-founders have likewise a diapason, serving to regulate the size, thickness, weight, &c. of their bells.

DIAPASON DIAEX, in musick, a kind of compound concord, whereof there are two sorts; the greater, which is in the proportion of 10:3; and the less in that of 16:5.

DIAPASON DIAPENTE, in musick, a compound consonance in a triple ratio, as 3:9. This interval, says Martianus Capella, consists of nine tones and a semi-tone, nineteen semi-tones, and thirty-eight dieses. It is a symphony made when the voice proceeds from the first to the twelfth sound.

DIAPASON DIATESSARON, in musick, a compound concord, founded on the proportion of 8:3. To this interval Marianus Capella allows eight tones and a semi-tone, seventeen semi-tones, and thirty-four dieses.

DIAPENTE, in musick, a perfect fifth.

If the tension of two strings be in proportion as 3 to 2, they will sound a diapente, when struck together.

DIAPENTE, in pharmacy, implies a composition consisting of five ingredients.

DIAPHANOUS, an epithet applied to all transparent bodies, or such as transmit the rays of light.

DIAPHORESIS, in medicine, an elimination of the humours through the pores of the skin.

DIAPHORETICKS, among physicians, a general name for all medicines that promote perspiration.

DIAPHRAGM, in anatomy, the midriff, a large strong muscular membrane, placed transversely in the trunk, and dividing the thorax from the abdomen.

DIAPRE, in heraldry, signifies the dividing a field or border into compartments, resembling fret-work.

DIARRHOEA, in medicine, a looseness, or a frequent and plentiful discharge of thin, watery, mucous, slimy, frothy, bilious, or blackish matter from the intestines, sometimes with, and sometimes without a mixture of the intestines.

The word is formed from the Greek, δια, through, and ρεω, to flow.

All sorts of substances whatever, possessed of any degree of acrimony, will stimulate the intestines, accelerate their peristaltick motion, invite a larger quantity of fluids to their glands, and cause a discharge of their contents by stool.

If alcalescent aliments be taken into the stomach in quantities superior to the power of digestion, they putrify, and becoming acrimonious, by their stimulus provoke a diarrhoea. Thus, those who eat stale fish fall frequently into a violent diarrhoea; and half a grain of putrified yolk of an egg will produce a great number of stools.

If acrescent aliment be taken in too large quantities, they putrify and contract an acid acrimony. Thus milk, if it turn acid on the stomach, purges; as do fruits and other vegetables under the same circumstances. If the stomach, intestines, liver, pancreas, or any part which has an immediate communication with the intestinal tube, be affected with an abscess of any kind, the acrimonious matter discharged stimulates the intestines, and produces a diarrhoea.

In case of an abscess in any part remote from the intestinal tube, as in the lungs, and so situated that it cannot be discharged externally, the patent orifices of

the veins may absorb a part, or even all the pus, and convey it to the arteries of the intestines, which may deposit this acrimonious matter upon them, where it may stimulate them to a diarrhoea; or, if this should not happen, the matter may be conveyed by the arteries to the veins which form the vena portæ, which does in some measure the office of an artery with respect to the liver: and here the matter may be separated from the mass of blood, discharged by the biliary ducts into the intestines, and thus pass off in copious stools.

If an evacuation, as perspiration, should be obstructed, the matter retained will acquire a tendency to acrimony, and be more likely to be deposited upon the intestines than any where else.

When the obstructing matter, in a chronical disorder, is resolved, moved, and mixed with the mass of blood, this may and is frequently conveyed to the intestines, and discharged by a diarrhoea. Thus persons who eat large quantities of the saponaceous spring herbs, or ripe fruits, fall into a plentiful diarrhoea, attended with salutary effects.

Hence we may perceive how careful physicians should be to investigate the causes of diarrhoeas, in order to prescribe judiciously, and to avoid doing a great deal of prejudice: for the matter must be carried off, either spontaneously, or by art, before any astringents can be administered; which seem only to be indicated when the discharge is so exorbitant as to endanger life; or when the emissaries of the glands that open into the intestines, are too much relaxed, after the stimulating cause is perfectly eliminated.

Destroying the peculiar acrimony that causes a diarrhoea, when that can be done, will bid fair to cure, or at least to alleviate the disorder.

DIARTHROSIS, in anatomy, a kind of articulation, or juncture of the bones, in which there is a manifest motion. See ARTICULATION.

The Diarthrosis comprehends, 1. The enarthrosis, in which the head of one of the bones is received into a deep cavity in the other, as in the articulation of the femur. 2. The arthrodia, in which the head of one of the bones is received into a slighter cavity in the other, as in the juncture of the os humeri with the scapula. 3. The ginglymus, in which the bones mutually receive, and are received by one another, as in the case in the articulation of the humerus and cubitus.

To these, Fallopius adds the trochoides, in which the motion is like that of a wheel about its axis, as is the case of the articulation of the first vertebræ of the neck with the second: and to all these some of the modern anatomists have added also the amphioarthrosis, a term which comprehends all those junctures of the bones which have a manifest motion, and which differ from the several articulations now described, either in regard of their figure, or the motion they allow of.

DIARY, among traders, denotes a day-book containing the proceedings of one day.

DIASCHISM, among musicians, denotes the difference between the comma and enharmonick diesis, commonly called the less comma.

DIASCORDIUM, in pharmacy, a celebrated composition, so called from scordium one of its ingredients.

DIASEBESTEN, in pharmacy, a soft purgative electuary, of which sebestens are the principal ingredients.

DIASENNA, in pharmacy, the name of a medicine in which fenna is the principal ingredient.

DIASIA, in Grecian antiquity, a festival kept at Athens in honour of Jupiter the Propitious.

DIASTASIS, a term used by ancient physicians for a distention of the muscles, or separation of the bones.

DIASTEM, among ancient musicians, the same with what the moderns call interval. See INTERVAL.

DIASTOLE, among physicians, signifies the dilatation of the heart, auricles, and arteries; and stands opposed to the systole, or contraction of the same parts. See the article HEART.

DIASTOLE, in grammar, implies the making a syllable long that is naturally short.

DIASTYLE, in the ancient architecture, an edifice where the columns stand at such a distance one from



the other, that eight modules, or four diameters, are allowed for the intercolumniation.

**DIASYRMUS**, in rhetoric, a kind of hyperbole, which signifies an exaggeration of some low ridiculous thing.

**DIATESSARON**, among the ancient musicians, a concord or harmonious interval, composed of a greater tone, a lesser tone, and one greater semitone; its proportion in numbers is as 4 to 3.

**DIATONICK**, an epithet applied to musick, as it proceeds by tones and semi-tones, both ascending and descending.

**DIBBLE**, or **DIBBER**, among gardeners, is the name of a tool employed in setting plants.

**DICHOTOMY**, a term used by astronomers for those phases or appearances of the moon, when she appears bisected, or shews only one half of her disk.

**DICHOTOMY**, among botanists, is applied to such plants, whose branches are divided into two; as the mistletoe, &c.

**DICKER**, an old and now almost obsolete word, applied to various commodities, and signifies ten. Thus a dicker of hides is ten skins, a dicker of gloves implies ten pair, &c.

**DICTATOR**, among the ancient Romans, was a magistrate invested with sovereign power.

**DICTION**, the phrase, style, or elocution of a speaker or writer.

**DICTIONARY**, a catalogue of all the words in a language, art, science, &c. ranged in alphabetical order.

**DIDACTICK**, instructive, or adapted to the province of teaching.

**DIDYNAMIA**, the fourteenth class of plants in the Linnæan system of botany, comprehending such as bear hermaphrodite flowers, furnished with four subulated stamina, inserted in the tube of the corolla, two whereof are shorter than the others, and placed together: the corolla in general is monopetalous and erect, of the ringent kind, the upper lip strait, and the lower spreading and trifid. See **BOTANY**.

It has its name from the longer stamina, being supposed more efficacious in fecundating the seeds than the rest; and as the genera belonging to it are very numerous, they have been divided into two series or orders, under the names of gymnosperma and angiosperma, the latter having, and the former wanting, a pericarpium or seed-vessel.

To this class belong baum, germandir, lavender, thyme, mint, betony, fox-glove, and divers other genera.

**DIESIS**, in musick, is the division of a tone less than a semi-tone, or an interval consisting only of an imperfect semi-tone.

**DIET**, in medicine, implies all sorts of fluids and solid aliments.

The principal and most general aliment is bread, whereof the crust is esteemed most easy of digestion, the crum being more oily and heavy. Pulse of all kinds nourish much, but are heavy, windy, and viscous, and consequently, are apt to cause obstructions. Rice, barley and oats, properly prepared, are nourishing, emollient and restorative. Nuts, almonds, and chestnuts, are full of a nourishing oil, but are hard of digestion. Fruits which are pulpy and tart, abound with water, and are refreshing, moistening and sedative, appeasing the too rapid motions of the blood, quenching thirst, and digesting easily: such are strawberries, gooseberries, currants, apricots, peaches, pears and apples. These should be eaten ripe, and in a small quantity at once; and the best way of all is to eat them boiled or baked, as being windy. Pot-herbs are less nourishing than the farinaceous or mealy substances. Lettuce, succory, sorrel, purslain, are cooling and refreshing; artichokes, cellery, cresses, asparagus, and parsley, are a little heating; and truffles, champignons, garlick, shallots, pepper, cloves, nutmegs, mustard, &c. heat very much.

Of animal substances used in diet, the flesh of young animals is preferred to that of old ones; and the flesh of wild animals is said to be lighter and more easily digested than that of tame.

Liquid aliments are milk, eggs, chocolate, soups and broths. Milk is good for weak persons, whose stomach is languid; and for children new-laid eggs yield very good nourishment, are easy of digestion, and agree with old people, and those of an exhausted body. Chocolate is a very agreeable and nourishing liquor; it strengthens the stomach, restores the body, helps the digestion, and softens sharp humours; and consequently is very proper for persons of a weak stomach.

As to drinks, wine taken too freely is prejudicial, but taken with moderation, it strengthens the stomach, and assists digestion. That malt liquor is accounted best, which is specifically lightest, and not saturated with too gross a substance, as passing more freely through the emunctories of the body, and especially by urine; for as to all thick, muddy, heavy and stale beer, not sufficiently boiled, it offends the head, generates wind, obstructions, the stranguary, asthma, and colick.

Tea promotes perspiration, strengthens and clears the stomach, and helps digestion. Coffee, taken after dinner, helps digestion, and allays the fumes of wine. Moderately taken, it thins the blood and humours; but its excess agitates the blood, causes watching, and occasions hæmorrhages.

From this view of the materials of diet, it appears, that the best way to preserve health, is to live upon plain simple foods, lightly seasoned, and in a quantity agreeable to the age, strength of the stomach, sex, constitution, and chiefly to what nature has by experience been found to require. Hunger shews the best time of eating, as thirst does of drinking. Persons who find no inconvenience from dining and supping every day, need not change their manner of life; and, in youth, something taken between meals is not amiss. When a person is much fatigued, and his spirits dissipated, it is proper to rest before eating; and, in cases of distress and sorrow, the food should be very light, and small in quantity. In summer, when the spirits and fluid parts are apt to evaporate, the diet should be moist, cooling, and easy of digestion, to repair the loss with the greater speed; whereas, in winter, the stomach will admit of more solid and heating aliments.

**DIET-DRINKS**, a form in physick, including all the medicated wines, ales and wheys, used in chronick cases. They require a course or continuation to answer any intention of moment. In all acute cases they are of no use; but where the disorder of a constitution is gradually to be gained upon, much help may be had from this quarter.

**DIET**, or **DYET**, in matters of policy, is used for the general assembly of the states, or circles of the empire of Germany and of Poland, to deliberate and concert measures proper to be taken for the good of the publick.

**DIETETICK**, something relating to diet, particularly that part of physick which treats of this subject.

**DIEU ET MON DROIT**, God and my right, the motto of the royal arms of England, first assumed by Richard I. to intimate that he did not hold his crown in vassalage of any mortal.

**DIEXAHEDRIA**, in natural history, a genus of pellucid and crystalliform spars, composed of two pyramids, joined base to base, without any intermediate column: the diexahedria are dodecahedral, or composed of two hexangular pyramids.

**DIFFARREATION**, in Roman antiquity, a ceremony whereby the divorce of the priests was solemnized, or the dissolving of marriage contracted by confarreation.

**DIFFERENCE**, in logick, signifies an essential attribute belonging to any species that is not found in the genus, and is the universal idea of that species: thus, body and spirit are two species of substance, which contain in their ideas something more than is in that of substance. In a body, we find impenetrability and extension; in a spirit, a power of thinking and reasoning; so that the difference of body is impenetrable extension, and the difference of a spirit is cogitation.

**DIFFERENCE**, in mathematicks, is the remainder, when one number or quantity is subtracted from another.



**DIFFERENCE of Longitude**, of two places on the earth, is an arch of the equator, comprehended between the meridians of these two places.

**DIFFERENCE of Ascension**. See the article **ASCENSIONAL Difference**.

**DIFFERENCES**, in heraldry, certain admittments to coat-armour, whereby something is added or altered to distinguish younger families from the elder.

**DIFFERENTIAL**, in the higher geometry, is an infinitely small quantity; or in other words, less than any assignable one.

**DIFFERENTIAL CALCULUS**, is the method of differencing quantities, that is, of finding a differential. See the article **CALCULUS DIFFERENTIALIS**.

**DIFFUSION**, the disposition of the subtle effluvia of bodies into a kind of atmosphere all round them. Thus the light diffused by the rays of the sun, issues all round from that amazing body of fire; and thus are the magnetick particles diffused every where round about our earth, and parts adjacent to it.

**DIGAMMA**, a name given to the letter F.

**DIGASTRICUS**, in anatomy, a muscle of the lower jaw, called also biverter. See **MUSCLES of the Human Body**.

**DIGEST**, *Digestum*, in matters of literature, a collection of the decisions of the Roman lawyers properly digested, or arranged under distinct heads, by order of the emperor Justinian. It constitutes the first part or volume of the civil law.

**DIGESTION**, in physick, is the dissolution or separation of the aliments into such minute parts as are fit to enter the lacteal vessels, and circulate with the mass of blood.

For the manner how digestion is performed, see the articles **BLOOD** and **CHYLE**.

**DIGESTION**, in chymistry, is the subjecting bodies included in proper vessels, to the action of a gentle and continued heat.

The vessels generally used to contain the matter to be digested, are matrasses or bolt-heads, and sometimes glasses; but where the heat is so gentle as to make no evaporation, the structure is indifferent. In cases where an evaporation does happen, and the exhaling fluid is of any value, the vessels are to be constructed so as to confine the vapour, and return it in a condensed state. This is called circulation, and is commonly executed by inverting the neck of a smaller matrass into that of a larger, in which case the conjoined glasses are called a pelican. There are several other kinds of pelicans of a more complex structure; but the flask used for Florence wine, divested of the straw-work, and inverted into a matrass with a very long neck, will conveniently answer all the purposes.

This operation is most generally performed in a sand-heat, and no greater adjustment of the degrees of heat is necessary for the purposes of pharmacy, that can be there effected; but formerly, when the more mysterious and operose methods were followed, the heat of dung-hills has been employed.

The degree of heat requisite in digestion differs according to the nature of the subject: in tinctures, made with strong spirit of wine, or volatile salts, and in solutions where a great effervescence is apt to arise, a very gentle one should never be exceeded. In aqueous solutions, and most other cases, a greater may be allowed; but it must always be understood to be less than will make the matter boil, otherwise the operation comes not within the proper meaning of the word digestion, which is a distinction from coction.

The time which digestion ought to be continued differs so greatly, according to the different application of the operation, that no other rule for it can be laid down than that it should be continued till the intention to which it is made subservient be compleated.

In circulatory digestions, it is proper to lute the vessels, to prevent the escape of the vapours through the junctures, but in many cases this following precaution is extremely necessary, viz. that a small aperture or vent be left, otherwise an incondensable vapour, which arises, will, if it cannot force the lute, inevitably burst the glasses. The instances in which this precaution is

necessary, are all mixtures of acid spirits, with earths, metals, or alkaline salts; or of such salts of those substances which can be acted on by them. But in solution of salts in water, and in extracts of gums, or resins, made with volatile salts, wine, or spirits of wine, it may be safely omitted. The college of London have, in their dispensary, as well according to the last edition as the former, used the word digestion in a sense different from the above definition, meaning by it only the suffering the ingredients of certain mixtures to be continued together without applying the use of heat, which they expressly order on each occasion to be applied or omitted by saying, digest with heat, or digest without heat: this is confounding the sense of the word digest with that of the word infuse.

**DIGESTION**, among physicians, is used for maturation, or that state of a disease, when the morbidick matter is so changed in bulk, figure, cohesion, mobility, &c. by the use of proper medicines, or even by the force of nature, as to be less noxious and hurtful, and consequently to abate the violence of the distemper.

**DIGESTION**, in surgery, is the disposing of an ulcer or wound to suppurate, or to discharge good pus, by the application of proper medicines. See the next article.

**DIGESTIVE**, in medicine, such remedies as strengthen and increase the tone of the stomach, and assist in the digestion of foods. See **DIGESTION**.

To this class belong all the stomachicks and strengtheners, or corroborants.

**DIGESTIVE**, in surgery, such medicines as are applied to wounds, &c. in order to promote a good maturation and laudable suppuration of matter. Lenient, anodyne and balsamick digestives, are to be applied to a gangrene. Digestives of turpentine, and the yolks of eggs, are useful in abscesses, wounds and ulcers.

**DIGESTOR**, in chymistry, a strong vessel made of copper, or iron, and fitted with a close cover and screws, so as to remain perfectly tight in a considerable degree of heat, whilst water, common air, and the subject of the operation are contained therein.

The cover of the digestor should always be provided with the valve to let out the steam, otherwise the vessel will certainly burst, whereby it may prove fatal to the by-standers.

Of all chymical vessels hitherto invented, the digestor seems best calculated for increasing the action of menstruums. Water, confined in a digestor, is susceptible of so much heat as to melt lead; and it is frequently found to melt the solder of lead and tin, wherewith the copper vessel was held together: here appears the necessity of using hard solder, made of spelter, or silver and brass, for this purpose; otherwise the digestor cannot contain the water, when much heated, without melting in the joints.

In this vessel, fresh ox-bone will be so digested in the space of a quarter of an hour, as to become soft and tender, and capable of being cut with a knife; and the water in which it was boiled, turned into a hard jelly, and a large cake of fat on its surface, when all is properly cooled.

**DIGGING**, among miners, is appropriated to the operation of freeing any kind of ore from the bed or stratum in which it lies, where every stroke of their tools turns to account; in contradistinction to the openings made in search of such ore, which are called hatches or essay-hatches, and the operation itself, tracing of mines, or hatching.

**DIGIT**, in astronomy, a measure by which it is usual to express the quantity observed in eclipses of the sun and moon. Its quantity is the twelfth part of the diameter of the luminary spoke of at that time, be it what it will.

**DIGITALIS**, foxglove, in botany, a genus of plants, whose flower is monopetalous, labiated, and bell-shaped, with four ditynaminus stamina. The fruit is bilocular, oval capsule, containing a number of small seeds. A species of foxglove grows naturally in many parts of England, and is reputed a cathartick, emetick and vulnerary.

**DIGITATED LEAF**, among botanists, is one which is composed of several foliola, joined to one foot-



foot-stalk at their base, spreading like the fingers of the hand; and one termed binate, ternate or quinate, according to the number of foliola of which the digitated leaf consists.

**DIGLYPH**, in architecture, a kind of imperfect triglyph, console, or the like, with two channels or engravings, either circular or angular.

**DIGNITARY**, in the canon law, a person who holds a dignity, that is, a benefice which gives him some pre-eminence over mere priests and canons. Such is a bishop, dean, arch-deacon, prebendary, &c. See **BISHOP**, **DEAN**, &c.

**DIGNITY**, as applied to the titles of noblemen, signifies honour and authority.

**DIGYNIA**, the name of an order or subdivision in the Linnæan system of botany, and is applied to those flowers which have two styles.

**DIHELIOS**, in astronomy, a name given by Kepler to that ordinate of the ellipse which passes through the focus where the sun is supposed to be placed.

**DIKE**, a ditch or drain made for the passage of waters. See the article **DITCH**.

**DIKE** also signifies a work of stone, timber, earth, fascines, &c. raised to oppose the entrance of the waters of the sea, a river, lake, &c.

The most stupendous works of this kind are the dikes of Holland.

**DIKE-REEVE**, an officer who takes care of the dikes and drains in Lincolnshire,

**DILAPIDATION**, in law, a wasteful destroying or letting buildings run to ruin and decay for want of proper reparation.

**DILEMMA**, in logick, an argument consisting of two or more propositions, which divides the whole into all its parts or members by a disjunct proposition, and then infers something concerning each part, which is finally referred to concerning the whole.

**DILL**, *Anethum*, in botany. See **ANETHUM**.

**DILLENIA**, in botany, a genus of the polyandria-polygynia class of plants; the corolla of which consists of five coriaceous, large, roundish, and hollow petals: the fruit is roundish, and externally covered with a number of capsules, which are oblong, and divided by a furrow; within, there is a large column or pulpy receptacle: the seeds are numerous, and very small; and nidulated underneath the capsules.

**DILUTE**. To dilute a body is to render it liquid; or, if it were liquid before, to render it more so, by the addition of a thinner thereto.

**DIMENSION**, in geometry, is either length, breadth, or thickness; hence a line hath one dimension, viz. length; a superficies two, viz. length and breadth; and a body, or solid, has three, viz. length, breadth and thickness.

**DIMENSION**, is also used with regard to the power of the roots of an equation, which are called the dimensions of that root; as in a cubick equation, the highest power has three dimensions of that root.

**DIMINISHED INTERVAL**, in musick, is a defective interval, or an interval that is short of its just quantity, by a less semi-tone, &c.

**DIMINUTION**, in architecture, a contraction of the upper part of a column, by which its diameter is made less than that of the lower part.

**DIMINUTION**, in rhetoric, is an orator's augmenting and exaggerating what he has to say, by an expression that seems to weaken and diminish it.

**DIMINUTIVE**, in grammar, is a word formed from some other, to soften or diminish the force and effect thereof, or to signify a thing that is little in its kind; thus bullock of bull, cellule of cell, globule of globe, hillock of hill, &c.

**DIOECIA**, in the Linnæan system of botany, the twenty-second class of plants, comprehending all those which have the male and female parts of fructification, or the stamens and pistil, on distinct plants of the same kind; in which respect, they bear some analogy to quadrupeds, whose males and females are likewise distinct. See the article **BOTANY**.

To this class belong the willow, hemp, poplar, ju-

niper, pistachia, yew, &c. in all which, the female plants alone produce seeds.

**DIOCESE**, the circuit or extent of a bishop's jurisdiction. England is divided into a temporal and ecclesiastical state; the first consisting of shires or counties, the other of dioceses, of which there are twenty-two in England, besides four in Wales. The ecclesiastical state is again divided into two provinces, viz. Canterbury and York; these are divided into dioceses, dioceses into archdeaconries, and those into parishes.

**DIONYSIAN Period**, in chronology. See **PERIOD**.

**DIOPTR**, the same with the index of alhidada of an astrolabe, or such instrument.

**DIOPTRA**, in surgery, is an instrument for dilating the natural cavities, in order to examine their state. Thus a speculum uteri, or ani, may be called a dioptra.

**DIOPTRICKS**, the science of refractive vision, or that part of opticks which considers the different refractions of light, in its passage through different mediums, as air, water, glass, &c.

**DIPHTHONG**, in grammar, a double vowel, or the mixture of two vowels, pronounced together, so as to make one syllable.

The Latins pronounced the two vowels in their Diphthongs much as we do, only that the one was heard somewhat weaker than the other, though the division was made with all the delicacy imaginable. Diphthongs with regard to the eyes are distinguished from those with regard to the ears. In the former, either the particular sound of each vowel is heard in the pronunciation, or the sound of one of them is drowned; or, lastly, a new sound, different from either, results from both: the first of these only are real diphthongs, as being such both to the eye and ear. Diphthongs, with regard to the ear, are either formed of two vowels, meeting in the same syllable, or whose sounds are severally heard; or of three vowels in the same syllable, which only afford two sounds in the pronunciation. English diphthongs, with regard both to eye and ear, are *ai, au, ea, oi, oo, ou*: improper English diphthongs, with regard to the eye only, are *aa, ea, ee, eu, ie, ei, oa, oe, ue, ui*.

**DIPLOE**, in anatomy, the soft medullium, which lies between the two laminæ of the cranium.

**DIPLOMA**, an instrument or licence given to a clergyman to exercise the ministerial function; or to a physician or surgeon to practise their profession.

**DIPPING-NEEDLE**, a long straight piece of steel equally poised upon an axis parallel to the horizon, and afterwards touched with a loadstone, in order to discover the exact tendency of the magnetick virtue. A needle placed in this manner will dip below the horizon, or the touched part of them directed to a point within the earth's surface; whence the name.

By several accurate experiments, Mr. Graham has made it appear, that the quantity of the needle's inclination to the horizontal line was an angle of about  $74$  or  $75^\circ$  that is, suppose *AB* (*plate XXVI. fig. 14.*) a touched needle, supported on the point, it will make an angle *ACH*, or *BCO*, with the horizontal line *HO* of  $74$  or  $75^\circ$ .

The learned Mr. Whiston has endeavoured to find the longitude at sea by means of the dipping-needle, but without success.

**DIPSACUS**, teasel, or teazel, in botany, a genus of plants, whose flowers consisting each of a tubular, erect petal, are collected in one common permanent perianthium; the receptacle is of a conical figure, beset with long scales, and contains columnar seeds, having a marginaceous rim. One of the species of teasel is cultivated for use, being of singular service in raising the knap on woollen cloth. It is propagated by sowing the seeds in March, and when come up are hoed out, as is practised with turnips, leaving them about 6 or 8 inches asunder: some time after they must be hoed again, enlarging their distance to at least a foot. The second year they will shoot up into heads, which will be fit to cut in August.



The leaves of wild teasel are recommended against flatulencies and crudities of the stomach.

DIPSAS, in zoology, a species of serpent, so called from its bite, creating a thirst that proved mortal.

DIPTERE, or DIPTERON, in the ancient architecture, signified a temple surrounded with two rows of columns, which form a sort of porticos, called wings, or isles. Pseudodiptere is the same, except that, instead of the double row of columns, this was only encompassed with a row of single ones.

DIPTOTES, in grammar, are such nouns as have only two cases, as suppetiæ, suppetias, &c.

DIRECT, in arithmetick: the rule of three direct is opposite to the rule of three inverse. See RULE OF THREE and PROPORTION.

DIRECT, in astronomy. A planet is said to be direct, when it appears to an observer on the earth to go forward in the zodiack, or according to the succession of the signs. See the article PLANET.

DIRECT RAY, in opticks, is a ray flowing from a point of a visible object directly to the eye, through one and the same medium.

DIRECT SPHERE. See the article SPHERE.

DIRECTION, in mechanicks signifies the line or path of a body's motion, along which it endeavours to proceed, according to the force impressed upon it.

Angle of DIRECTION, that formed by the lines of direction of two conspiring powers.

Quantity of DIRECTION, a term used by some mathematicians for the product of the velocity of the common centre of gravity of a system of bodies, by the sum of their quantities of matter: this is nowise altered by any collisions among the bodies themselves.

Magnetical DIRECTION, denotes the tendency of the load-stone, and other magnetick bodies, to certain points called their poles: thus, a magnetical needle always presents one of its ends towards the north pole of the world, and the other towards the south pole.

DIRECTOR, in commercial polity, a person who has the management of the affairs of a trading company: thus we say, the directors of the India company, South-sea company, &c.

DIRECTOR, in surgery, a grooved probe, to direct the edge of the knife or scissars in opening sinuses, or fistulæ, that by this means the sub-adjacent vessels, nerves and tendons, may remain unhurt.

DIRIGENT, or DIRECTRIX, a term in geometry, signifying the line of motion, along which the describent line or surface is carried in the genesis of any plane or solid figure.

DISBUDDING of Trees, signifies the taking away such branches or sprigs, newly put forth, as are ill-placed.

DISBURDENING of Trees, the taking off part of the leaves and fruit, when too numerous, that those left may grow the larger.

DISCK, *Discus*, in antiquity, a quoit made of stone, iron or copper, five or six fingers broad, and more than a foot long, inclining to an oval figure, which they hurled in the manner of a bowl, to a vast distance, by the help of a leathern thong tied round the person's hand who threw it, and put through a hole in the middle.

DISCK, in astronomy, the faces of the sun and moon as they appear to an observer at the earth; also the face of the earth as it would appear to an observer in the moon, &c.

The disk in eclipses is conceived to be divided into twelve equal parts, called digits.

In a total eclipse of these luminaries, the whole disk is obscured; in a partial one, only a part thereof.

DISCK, or DISK, in botany, is an aggregate of corleulæ or partial flowers forming a circular plane in a compound flower.

DISCK, in opticks, is the width of the aperture of telescope glasses, whatever their form be, whether plane, convex, concave, &c.

DISCERNING, is that act of the mind by which it extinguishes ideas.

DISCIPLINE, is the instruction and strict order

observed by some persons; and sometimes it means correction.

DISCLAIMER, in law, is a plea containing an express denial or refusal.

DISCORD, in musick, the relation of two sounds, which are in themselves disagreeable, whether applied in succession or consonance.

The harmony of discords is that wherein the discords are made use of, as the solid and substantial part of the harmony: for by a proper interposition of a discord, the succeeding concords receive an additional lustre. Thus the discords are in musick, what the strong shades are in painting.

The essential principles of harmony, harmonical intervals, or concords, are but few in number, only eight; the indefinite numbers of other ratios being all discords. Hence M. Malcolm shews the necessity of taking some of these discords into the system of musick.

In order to this, he considers the effect of having none but harmonical intervals therein.

First, with respect to a single voice, if that should move always from one degree to another, so as every note or sound of the voice were in the ratio of some concord, the variety, which is the life of musick, would soon be exhausted; for to move no other than by harmonical intervals would not only want variety, and so disgust us with a tedious repetition of the same things; but the very perfection of such relation of sounds would cloy the ear, in the same manner as sweet and luscious things do the taste; which, for that reason, are artfully seasoned with others of a different quality.

Secondly, with respect to musick in parts, i. e. where two or more voices join in consonance, the general rule is, that the successive sounds of each be so ordered, that the several voices shall be all concords.

In what cases, and for what reasons discords are allowed, the rules of composition must teach; but by only joining these two considerations, &c. we find how imperfect musick would be, without any other intervals than concords.

DISCOVERY, in dramatick poetry, a manner of unravelling a plot, or fable, in tragedies, comedies, and romances, wherein, by some unforeseen accident, a discovery is made of the name, fortune, quality, &c. of a principal person, which were before unknown.

DISCOUNT, in commerce, is a sum deducted or retained in hand, upon paying money before it is due; also an allowance upon a bill of exchange, or other debt, not yet become due.

DISCOUS Flower, in botany, it such whose disk is an aggregate of florets, forming, as it were, a plane surface.

DISCRETE, or DISJUNCT, *Proportion*, is when the ratio between two pairs of numbers or quantities is the same; but there is not the same proportion between all the four numbers: thus, if these numbers 6:8::3:4 be considered, the ratio between the first part 6 and 8 is the same as that between 3 and 4; and therefore these numbers are proportional, but it is only discretely or disjunctly; for 6 is not to 8, as 8 to 3; that is, the proportion is not continued all along as in the following, called continual proportionals 3:6::12:24.

DISCRETIVE *Propositions*, are those where various judgments are formed by the particles *but*, *notwithstanding*, &c. either expressed or understood. Thus, "those who cross the seas change their country, but not their disposition," is a discretive proposition.

DISCUS, a heavy instrument used by the ancients in their publick games.

DISDIAPASON, or BISDIAPSON, in musick, a compound concord, described by F. Parran, in the quadruple ratio of 4:1, or 8:2.

DISEASE, in medicine, that state of a living body when deprived of any of its functions, whether vital, natural or animal.

Several authors have given us compendious theories of diseases. Bontekoe deduces all human diseases from the scorbutus; Musgrave from the arthritis; Dr. Woodward from the bile; some from the venereal virus, which has lurked in the seed ever since the sin of Adam; some from extraneous ferments formed in or out of us, and some from worms.



*Endemick DISEASES.* See the article ENDEMICK.

*Epidemick DISEASES.* See the article EPIDEMICK.

DISFRANCHISING, among civilians, implies the depriving a person of the rights and privileges of a free citizen or subject.

DISH, among miners, signifies a wooden vessel by which they measure their ore; it is kept by the bar-master, and contains about 672 solid inches.

DISJUNCTIVE PROPOSITION, in logick, is that where of several predicates we affirm one necessarily to belong to the subject to the exclusion of all the rest, but leave that particular predicate undetermined.

DISK, or DISCK. See the article DISCK.

DISLOCATION, in surgery, the same with luxation. See the article LUXATION.

DISPART, in gunnery, a small piece of wood, &c. fastened upon the muzzle ring of a piece of ordnance with wax or pitch. The height of the dispart must be such that a line drawn from the top of it to the basering near the touch-hole, may be parallel to the axis of the piece. The general method of finding the height of the dispart is to take the radius of the muzzle and baserings, and subtract the former from the latter, when the remainder will be the height of the dispart required.

DISPENSARY, or DISPENSATORY, a repository or shop for selling medicines at prime cost for the benefit of the poor.

It is also the title of several books, containing the method of preparing the various sorts of medicines used in the practice of physick.

DISPENSATION, in law, the granting a license for doing something, which would otherwise be unlawful.

DISPENSATORY, or DISPENSARY. See DISPENSARY.

DISPERSION *of the Rays of Light*, in opticks, the same with the divergency of the rays, or their receding from each other.

DISPLAYED, in heraldry, is understood of the position of an eagle, or any other bird, when it is erect, with its wings expanded or spread forth.

DISPONDEE, *dispondeus*, in the Greek and Latin poetry, a double spondee or foot, consisting of four long syllables.

DISPOSITION, in architecture, the just placing the several parts of an edifice, according to their proper nature and office.

DISPOSITION, in rhetorick, the placing words in such an order as contributes most to the beauty and sometimes even to the strength of a discourse.

Nature formed man with a taste which makes him sensible of harmony and cadence: for this we need only consult nature, study the genius of the language and sound, and, as it were, interrogate our ears: for let a thought be ever so beautiful in itself, if the words which express it are ill placed, the delicacy of the ear is shocked at it; a harsh and unharmonious composition grates it, whereas it is generally flattered with that which is soft and flowing. There are no expressions, however harsh they may appear in themselves, but may contribute to the harmony of a discourse, when judiciously ranged. Isocrates was the first among the Greeks that made them sensible of the beauty of disposition, as Cicero did the Romans.

DISPROPORTION, a general term for any kind of irregularity or want of proportion in the parts of any object.

DISSECTION, among anatomists, implies the separating the several parts of a body, in order to examine their construction, situation, use, and connection.

DISSEISIN, in law, an unlawful dispossessing a person of his lands or tenements. It is of two sorts, single disseisin, which is committed without force of arms, or disseisin by force of arms, more properly termed forcement.

The disturbing a person from entering on his land, or hindering him from tilling it, are both disseisins of land; and denial of rent, when lawfully demanded, is a disseisin of the rent.

DISSENTERS, a general denomination of equal

import with non-conformists; and is expressive of certain sects or parties in England, who, in matters of religion, church-discipline and ceremonies, dissent from the church of England, and have a toleration by law for the same. Such are the Presbyterians, Independents, Quakers, and Anabaptists.

DISSIMILAR, in general, an appellation given to things which are unlike: thus the seminal or first leaves of plants, are called dissimilars, as being generally of a different figure from those of the grown plants.

DISSIMILAR PARTS, in anatomy, those compounded of parts of various structure, such are all the limbs of the body.

DISSIMILITUDE, in general, denotes whatever constitutes the difference between two dissimilar things. See the articles DISSIMILAR and SIMILITUDE.

DISSIMILITUDE, in rhetorick, an argument wherein from dissimilar unlike things, other dissimilars are deduced.

DISSIPATION, in physicks, an insensible loss or consumption of the minute parts of the body; or that flux whereby they fly off, and are lost.

*Circle of DISSIPATION*, in opticks, is used for that circular space upon the retina, which is taken up by one of the extreme pencils or rays issuing from an object.

To understand this, it is to be observed, that when the distance of an object from the eye is too small or too great for perfect or distinct vision, the rays of each pencil, issuing from the object, cannot be united at a point on the retina, but beyond it, or before they arrive at the retina; consequently, the rays of each pencil will occupy a circular space upon the retina, and this circle is called the circle of dissipation, because the rays of a pencil, instead of being collected into a central point, are dissipated all over this circle.

The consideration of the circles of dissipation, formed by the rays coming from the extremities of objects, is of use to account for several curious phenomena of vision.

DISSOLVENT, in general, whatever dissolves or reduces a solid body into such minutes parts as to be sustained in a fluid. The principal dissolvents for metals are aqua-regia and aqua fortis; for salts, earths and gums, water; for coral and other alkaline substances, distilled vinegar or spirits of wine. Dissolvents are the same with what the chymists call menstrua. See the article MENSTRUUM.

*Universal DISSOLVENT.* See ALKAHEST.

DISSOLUTION, in chymistry, the same with solution. See the article SOLUTION.

DISSOLUTION, in musick, is when a sound in the enharmonick genus is lowered three dièses; for thereby that genus is dissolved, and the musick, or that interval at least, is chromatick.

DISSONANCE, in musick, the same with discord. See the article DISCORD.

DISSYLLABLE, among grammarians, a word consisting only of two syllables: such are nature, science, &c.

DISTAFF, an instrument about which flax is tied in order to be spun.

DISTANCE, the interval between two things, either with regard to time, place, or quantity.

*Accessible DISTANCES*, in geometry, are such as may be measured by the chain.

*Inaccessible DISTANCES*, are such as cannot be measured by the chain, &c. by reason of some river, or the like, which obstructs our passing from one object to another.

Inaccessible distances may be measured in the following manner: Suppose it were required to measure the distance between the station A (*plate XXVII. fig. 7.*) and the object at C. Assume another station, as B, from whence the object may be seen. Then, with any proper instrument, take the angles CAB and CBA, and measure the distance AB.

Then in the triangle ABC are given the three angles and the distance AB; whence the distance AC, required, may be easily found thus, as the sine of the angle C: the distance AB::the sine of the angle B:AC, required.



But small inaccessible distances may be measured from one station in the following manner: Let *AB* (*plate XXVII. fig. 6.*) represent an inaccessible distance to be measured. Set up perpendicular a stick *CA*, of a known length; place the centre of your quadrant *C* on the top of the stick, and look through the sights of it, till the visual ray points to the object at *B*. Then in the right-angled triangle *BAC* are given the perpendicular *AC* and the angle *ACB*; and therefore, if *AC* be supposed the radius, the required side will be the tangent to the given angle *ACB*; whence to find *AB* it will be, as the radius to *AC*, so is the tangent of the angle *ACB*, to *AB*, required.

**DISTANCE**, in navigation, is the number of minutes or leagues a ship has sailed from any given place or point.

**DISTANCE of the Eye**, in perspective, is a line drawn from the eye to the principal point.

**DISTANCE of the Bastions**, in fortification, is the side of the exterior polygon.

**Curtate DISTANCE**, in astronomy, is the distance of the planet's place, reduced to the ecliptick, from the sun.

**DISTEMPER**, among physicians, the same with disease. See the article **DISEASE**.

**DISTEMPER**, in painting, a term used for working up of colours with something besides water or oil. If the colours are prepared with water, that part of painting is called limning; and if with oil, it is called painting in oil, and simply painting. If the colours are mixed with size, whites of eggs, or any such proper glutinous or unctuous matter, and not with oil, then they say it is done in distemper.

**DISTICH**, *distichon*, a couplet of verses making a complete sense. Thus hexameter and pentameter verses are disposed in distichs.

**DISTICHIASIS**, in surgery, a disease of the eyelids, when under the ordinary eye-lashes there grows another extraordinary row of hair, which frequently eradicates the former, and pricking the membrane of the eye, excites pain, and brings on a defluxion. It is cured by pulling out the second row of hairs with nippers, and cauterizing the pores out of which they issued.

**DISTILLATION**, in chymistry, the act of drawing off the spiritous, aqueous, oleaginous, or saline parts of a mixed body from the grosser and more terrestrial parts by means of fire, and collecting and condensing them again by cold. The end of distillation is of two kinds: the first, and by far the most general, is for the separation of some acquired bodies from others with which they were mixed, as in the case of vinous and volatile spirits, and essential oils: the other is for the quicker and more effectual combination of such bodies, whose mixture is assisted by a boiling heat, as in the case of spir. nitr. dulc. See **CHYMISTRY**.

*The method of distilling malt-wash or a fermented mixture of meal and malt, for spirit.* Fill two thirds of a still, first moistened by the steam of boiling water, with malt-wash; immediately clap on the head, and lute it down; there will soon run a spirituous inflammable liquor. Thus is obtained what the malt-distillers call a malt low-wine; what comes over after the spirit falls off from being proof, is called faints. This experiment may be rendered general, with slight variation; for if any wine, beer, or fermented liquor from sugar, treacle, or fruits, &c. be thus treated, it affords a spirit differing only according to the nature of the subject; but none of them will afford the least inflammable spirit without a previous fermentation. The requisite cautions for success are, 1. That the fermentation be well performed. 2. That it be gently distilled with a soft well regulated fire. 3. That the grosser oil, apt to rise along with the spirit, be let out by flannel under the nose of the worm. These cautions observed, the low-wines will be pure and vinous.

*The method of distilling the lower wines into proof spirits for sale.* The lower wines of the last process, distilled in a bath-heat, give a higher rectified spirit than before, which being let down with fair water to a certain size or standard, called proof, is what the malt-distillers understand by proof-goods, or their rectified malt-spirit.

The inconveniences of this art, on account of the

many large vessels required, which increase the labour and price of the commodity, might perhaps be remedied by the introduction of a new art, subservient to the malt-distillers, and confined to the boiling down the malt-wort to a rob; wherefore it were to be wished, that those who were skilled in this branch of distillation would try whether a spirit superior to that of treacle may not be procured from the rob of malt, prudently prepared and fermented. See **CHYMISTRY**.

**DISTINCT Notion or Idea**, is that wherein the mind perceives a difference from all other ideas.

**DISTINCT Base**, in opticks, is that precise distance from the pole of a convex glass, in which objects, beheld through it, appear distinct and well defined; so that is the same with the focus.

The distinct base is caused by the collection of the rays that proceed from a single point in the object into a single point in the representation; and therefore concave glasses, which dissipate the rays, can have no real distinct base.

**DISTINCTION**, in logick, is an assemblage of two or more words, whereby different things or their conceptions are denoted.

**DISTRESS**, in law, seizing or distraining any thing for rent in arrear, or other duty unperformed.

**DISTRIBUTION**, in architecture, the dividing and dispensing the several parts and pieces which compose a building, as the plan directs.

**DISTRIBUTION**, in logick, is a kind of division which distinguishes an universal whole into its several kinds of species; as division is to distinguish an integral whole into its several parts.

**DISTRIBUTION**, in rhetorick, a kind of description, whereby an orderly division and enumeration is made of the principal qualities of the subject.

**DISTRIBUTION**, in printing, the taking a form asunder, separating the letters, and disposing them in the cases again, each in its proper cell. See **PRINTING**.

**DISTRIBUTIVE JUSTICE**, is that whereby we give every person what properly belongs to him.

**DISTRICT**, in geography, a part of a province distinguished by peculiar magistrates, or certain privileges; in which sense it is synonymous with hundred. See the article **HUNDRED**.

**DITCH**, in country affairs, a narrow channel or trench made for draining marshy grounds, the conveyance of water, or inclosing fields.

**DITHYRAMBICK**, something belonging to the dithyrambus, as a dithyrambick verse, a dithyrambick poet, &c.

The dithyrambick poetry was very bold and irregular; for the poets not only took the liberty to forge new words for the purpose, but made double and compound words, which contributed very much to the magnificence of this sort of poetry.

**DITHYRAMBUS**, in ancient poetry, a hymn in honour of Bacchus, full of transport and poetical rage.

**DITONE**, in musick, an interval comprehending two tones.

**DITRIGLYPH**, in architecture, the space between two triglyphs. See the article **TRIGLYPH**.

**DITTO**, usually written *D°* in books of accompts, an Italian word, signifying the afore-mentioned.

**DIVAN**, a council-chamber, or court of justice, among the eastern nations, particularly the Turks.

**DIVERGING**, or **DIVERGENT Lines**, in geometry, are those which constantly recede from each other.

**DIVERGING or DIVERGENT Rays**, in opticks, are those which, going from a point to the visible object, are dispersed and continually depart one from another, in proportion as they are removed from the object.

**DIVERGING Hyperbola**, is one whose legs turn their convexities towards one another, and run outwards quite contrary ways.

**DIVERGING Series**. See the article **SERIES**.

**DIVERSION**, in military affairs, is when an enemy is attacked in one place where they are weak and unprovided, in order to draw off their forces from making an irruption somewhere else. Thus the Romans gave a diversion to Hannibal from Italy, by their attacking Carthage.

**DIVER-**



**DIVERSION**, in physick, is when, by means of medicines, an attempt is made to give a different turn to the flux of humours; thus blood-letting makes a great diversion.

**DIVIDEND**, in arithmetick, is the number proposed to be divided into a certain number of equal parts.

**DIVINATION**, is the knowledge of things obscure or future, which cannot be attained by any natural means.

**DIVING**, the art or act of descending under water to considerable depths, and abiding there a competent time.

**DIVING-BELL**, is a machine for the safe conveyance of a diver to any reasonable depth under water, and in such manner that he may stay for some considerable time.

The diving-bell is most conveniently made, in form of a truncated cone, the smaller basis being close, and the larger open, and to be so poised with lead and so suspended, as that the vessel may sink full of air with its open or larger basis downwards, and as near as possible, in a position parallel to the horizon, so as to close with the surface of the water all at once: under this receptacle the diver sinks down together with the included air into the depth desired; and if the cavity of the vessel contains a tun of water, a single man may remain therein at least an hour, without much inconvenience, 5 or 6 fathoms deep; but this included air, as it descends lower, contracts itself according to the weight of the water that compresses it; so as that at 33 feet deep, or thereabouts, the bell will be half full of water, the pressure thereof being then equal to that of the whole atmosphere; and at all other depths, the space possessed by the compressed air in the upper part of the bell will be to the under part of its capacity filled with water, as 33 feet to the depth of the surface of the water in the bell below the common surface thereof; and this condensed air, being taken in with the breath, soon insinuates itself into all the cavities of the body, and has no sensible effect, if the bell be permitted to descend so slowly as to allow time for that purpose; the only inconvenience that attends it is found in the ears, within which there are cavities opening only outwards, and that by pores so small, as not to give admission even to the air itself, unless dilated by a considerable force: hence on the first descent of the bell a pressure begins to be felt on each ear, which by degrees grows painful, as if a quill was forcibly thrust into the hole of the ear, till at length the force overcoming the obstacle, that which constricts these pores yields to the pressure, and letting some condensed air slip in, present ease ensues; but the bell descending still lower, the pain is renewed, and again eased, after the same manner: on the contrary, when the engine is drawn up again, the condensed air finds a much easier passage out of those cavities, and even without pain; this force on the auditory passages might possibly be suspected to be prejudicial to the organs of hearing, but experience teaches the contrary; but what is more inconvenient in this engine is the water entering into it, so as to contract the bulk of air, according to the afore said rule, into so small a space, as that it soon heats and becomes unfit for respiration, for which reason it must be often drawn up to recruit again; and besides, the diver, being almost covered with the water thus entering into his receptacle, will not be long able to endure the cold thereof.

To obviate these difficulties, which attend the use of the common diving-bell, the late Dr. Halley contrived means to convey air down to it, whilst below; whereby not only the included air was renewed and recruited, but also the water intirely driven out, at whatever depth it happened to be; and this he effected by an easy contrivance, which may furnish air at the bottom of the sea in any quantity desired; the description of the apparatus is as follows:

The bell he made use of was of wood, containing about sixty cubick feet in its concavity, and of the form of a truncated cone, whose diameter at top was three feet, and at the bottom five: (See *plate XXXII. fig. 5.*) this he coated with so much lead at the bottom I K, as

that it would sink empty; and he distributed the weight in such a manner about its bottom, that it would go down in a perpendicular position and no other; in the top he fixed a strong but clear glass, D, as a window to let in the light from above; and likewise a cock, at B, to let out the hot air that had been breathed; and below, about a yard under the bell, he placed a stage, LM, which hung by three ropes, each of which was charged with about one hundred weight, to keep it steady; this machine he suspended from the mast of a ship, by a sprit, which was sufficiently secured by stays to the mast-head, and was directed by braces to carry it over-board, clear of the ship's side, and to bring it again within-board, as occasion required.

To supply fresh air to this bell, when under water, he caused a couple of barrels, like that at C, of about thirty-six gallons each, to be cased with lead, so as to sink empty; each having a bung-hole in its lowest part, to let in the water, as the air in them condensed on their descent, and to let it out again, when they were drawn up full from below; and to a hole in the uppermost part of these barrels he fixed a leathern trunk or hose, well liquored with bees-wax and oil, and long enough to fall below the bung-hole, kept down by a weight appended; so that the air in the upper part of the barrels could not escape, unless the lower ends of these holes were first lifted up.

The air-barrels being thus prepared, he fitted them with tackle proper to make them rise and fall alternately, after the manner of two buckets in a well; which was done with so much ease, that two men with less than half their strength could perform all the labour required: and in their descent they were directed by lines, fastened to the under edge of the bell, which passed through rings placed on both sides the leathern hose in each barrel; so that sliding down by those lines, they came readily to the hand of a man, who stood on the stage on purpose to receive them, and to take up the ends of the hose into the bell; through these hose, as soon as their ends came above the surface of the water in the barrels, all the air included in the upper parts was blown with great force into the bell, whilst the water entered at the bung-holes below, and filled them; and as soon as the air of the one barrel had been received, upon a signal given, that was drawn up, and at the same time the other descended; and by an alternate succession furnished air so quick, and in so great plenty, that the Doctor himself was one of five who had been together at the bottom, in nine or ten fathoms water, for above an hour and a half at a time, without any sort of bad consequence; and he might have continued there as long as he pleased, for any thing that appeared to the contrary; besides, the whole cavity of the bell was kept entirely free from water; so that he sat on a bench diametrically placed near the bottom, being quite dressed with all his cloaths on: he only observed, that it was necessary to be let down gradually at first, as about twelve foot at a time, and then to stop and drive out the water that entered, by receiving three or four barrels of fresh air before he descended further; but being arrived at the depth designed, he then let out out as much of the hot air, that had been breathed, as each barrel would replenish with cold air, by means of the cock at the top of the bell; through whose aperture, though very small, the air would rush with so much violence, as to make the surfaces of the sea boil, and cover it with a white foam, notwithstanding the great weight of water over him.

Thus the doctor found he could do any thing that was required to be done just under him; and that, by taking off the stage, he could, for a space as wide as the circuit of the bell, lay the bottom of the sea so far dry, as not be over shoes thereon; and by the glass window so much light was transmitted, that, when the sea was clear, and especially when the sun shone, he could see perfectly well either to read or write, much more to fasten or lay hold on any thing under him that was to be taken up; and by the return of the air-barrels, he has often sent up orders, written with an iron pen on small plates of lead, directing how to move him from place to place, as occasion required; at other times,



times, when the water was troubled and thick, it would be below as dark as night; but in such a case, he could keep a candle burning in the bell as long as he pleased, notwithstanding the great expence of air requisite to maintain flame.

This diving-bell received its last improvement from Mr. Martin Triewald, F. R. S. captain of mechanicks and military architecture to his Swedish majesty; the manner and form whereof is shewn in *plate XXXII. fig. 6.* which is a figure of his own drawing. AB is the bell, which, as appears by the scale of feet under it, is much less than Dr. Halley's, and therefore will come cheaper. It is sunk with leaden weights D, D, appended at the bottom, the substance of the bell is copper, and tinned within all over; and, as in the rivers and coasts of the Baltick sea the water is very clear, so he has illuminated the bell with three strong convex lenses G, G, G, with copper lids H, H, H, to defend them.

The iron ring or plate E, serves the diver to stand upon, when he is at work ; and is suspended at such a distance from the bottom of the bell, that, when the diver stands upright, his head is just above the water in the bell ; and it is much better there than higher up in the bell, because the air is colder, and consequently more fresh and fit for respiration near the surface of the water than towards the top of the bell.

But when there is occasion for the diver to be wholly in the bell, and his head of course in the upper part, Mr. Triewald contrived, that even there, when he has breathed the hot air as long as he well can, by means of a spiral copper tube *b, c*, placed close to the inside of the bell, he may then draw the cooler and fresher air from the lowermost parts; to which end, a flexible leather tube, about two feet long, is fixed to the upper end of the tube at *b*, to the other end of which is a turned ivory mouth-piece, for the diver to hold in his mouth to respire the air from below by; and this he may do in any posture of standing, sitting, bowing his body, &c.

**DIVINITY**, the nature, quality, and essence of the Divine Being. It is also used to signify the science that instructs us in the knowledge of God, and the things he has thought proper to reveal.

DIVISIBILITY, in philosophy, that disposition of a body, whereby it is conceived to have parts, into which it may be divided either actually or mentally.

That body is extended is self-evident, it being impossible to conceive any body, which has not length, breadth, and thickness, that is, extension.

It is no less evident, that body is divisible; for, since no two particles of matter can exist in the same place, it follows that they are distinct from each other, which is all that is meant by being divisible.

In this sense the least conceivable particle must still be divisible, since it will consist of parts, which will be really distinct. To illustrate this by a familiar instance: let the least imaginable piece of matter be conceived lying on a plane smooth surface, it is evident the surface will not touch it every where, those parts therefore, which it does not touch, may be supposed separable from the other, and so on as far as we please; and this is all that is meant, when we say matter is infinitely divisible.

This proposition is demonstrated geometrically thus ; suppose the line AD (*plate XXVII. fig. 8.*) perpendicular to BF, and another at GH, at a small distance from it, also perpendicular to the same line ; from the centers C, C, C, &c. describe circles cutting the line GH in the points *e, e, e, &c.* Now the greater the radius AC is, the less is the part *eH*. But the radius may be augmented in infinitum. So long therefore the part *eH* may be divided into still less portions ; consequently it may be divided in infinitum.

How far matter may actually be divided, may in some manner be conceived from hence that a piece of wire, gilt with so small a quantity as eight grains of gold, may be drawn out to a length of 13,000 feet, the whole surface of it still remaining covered with gold.

We have a surprising instance of the minuteness of some parts of matter, from the nature of light and

vision. Let a candle be lighted and placed in an open plane, it will then be visible two miles round; consequently, was it placed two miles above the surface of the earth, it would fill with luminous particles a sphere whose diameter was four miles, and that before it had lost any sensible part of its weight.

A quantity of vitriol, being dissolved and mixed with 9000 times as much water, will tinge the whole; consequently the vitriol will be divided into as many parts as there are visible portions of matter in that quantity of water.

Dr. Keill hath computed the magnitude of a particle of *assa foetida* to be  $\frac{38}{1000000000000000000}$  parts of a cubick inch.

He has likewise shewn that one of those globules of blood which circulate in the veins of some very small creatures, doth not exceed the

Once more, he hath also demonstrated that one grain of sand will contain 1250000000000000000000000000000 of the aforefaid blood-globules; that is, 10256 times more than the highest mountain upon earth contains grains of sand.

Lastly, he hath shewn that the least particle of matter may be made to fill the greatest space (suppose the orb of Saturn) so that there shall be no pore therein, whose diameter shall exceed the 1000000000000th, &c. part of an inch.

It may not be unacceptable to the reader to have some idea of the surprizing smallness of microscopick animalcules, from calculation. Suppose such an animalcule be *AB* (*plate XXVII. fig. 10.*) which is made visible by the lens *C* at the distance of *BC*, which suppose one tenth of an inch; then will the *ACB* be equal to one minute, for under such an angle an object will but just appear or be visible.

Then, in the right-angled triangle A C B, there is known the side B C =  $\frac{1}{16}$ th of an inch, and the angle C =  $90^\circ$  or  $1^c$ , to find the side A B, the length of the animalcule, which is thus found by trigonometry :

As the radius \_\_\_\_\_ is 10.000000  
 To the base — AC = 0.1 = 1.000000  
 So is the tangent of ACB = 00° 01' = 6.463726  
 To the side — AB = 0.000029 = 5.463726 ;

That is, suppose an inch divided into a million of equal parts, this animalcule A B will be no more than 29 of those parts in length.

Suppose it were as wide as long, the whole surface thereof would be 0,0000000084; that is, 84 of 1,000,000,000 of equal parts of an inch square.

Laſtly, ſuppoſe it of a cubick figure, it will then be but a 0,0000000000000024, *i. e.*  $\frac{24}{1000000000000000}$ , or 24 of a thouſand millions of millions of equal parts of a cubick inch.

If then the animalculè itself be of such an inconceivable and stupendous smallness, how small must the finest particles of the fluids be which flow through the finest vessels of its organized body! this doubtless exceeds all calculation, and the force of imagination itself.

In order that the reader may form some idea of the smallness of the divisions of a line of an inch in length, we have given a figure, (*plate XXVII. fig. 9.*) wherein the inch is divided into two hundred equal parts. These divisions are hardly distinguishable by the naked eye; and had the inch been divided into one thousand equal parts, they could not have been perceived, without a magnifying glass.

**DIVISION**, in a general sense, implies the act of dividing a body, substance, number, or quantity into its component parts.

**DIVISION**, in arithmetick, discovers how often one number is contained in another; or, division, from two numbers given, finds a third, which contains unity as often as the one given number contains the other.

The number to be divided, or which contains the other, is called the *dividend*; the number by which we divide, or which is contained in the dividend, is called the *divisor*; and the number found by division, or which



expresses how often the dividend contains the divisor, is called the *quotient* or *quota*.

Suppose it was required to divide 63 by 7; first seek how often 7 is contained in 63, and the answer is 9, which must be placed in the quotient; and consequently, 63 divided by 7 is equal to 9. Moreover, to divide 371 by 7, prefix the divisor 7, and beginning at the first figures of the dividend, coming as near them as possible, say, how many times is 7 contained in 37, and you will find 5; then writing five in the quotient, subtract  $5 \times 7$ , or 35 from 37, and there will remain 2; to which set the last figure of the dividend, viz. 1, and then 21 will be the remaining part of the dividend for the operation; say therefore as before, how many times is 7 contained in 21 and the answer will be 3; wherefore, writing 3 in the quotient, take  $3 \times 7$ , or 21 from 21, and there will remain 0. Whence it is manifest, that 53 is precisely the number that arises from the division of 371 by 7.

And thus to divide 4798 by 23; first beginning with the initial figures 47, say, how many times is 23 contained in 47, answer 2; wherefore write two in the quotient, and from 47 subtract  $2 \times 23$ , or 46, and there will remain 1, to which join the next number of the dividend, viz. 9, and you will have 19 to work upon next: Say, therefore, how many times is 23 contained in 19, answer 0; wherefore write 0 in the quotient; and from 19 subtract  $0 \times 23$ , or 0, and there remains 19, to which join the last number 8, and you will have 198 to work upon next; wherefore in the last place say how many times is 23 contained in 198, which may be guessed at from the first figures of each, 2 and 19, by taking notice how many times 2 is contained in 19, I answer 8; wherefore write 8 in the quotient, and from 198 subtract  $8 \times 23$ , or 184, and there will remain 14 to be further

divided by 23; and so the quotient will be  $208\frac{14}{23}$ . And if this fraction is to be avoided, you must continue the division in decimal fractions, by adding always a cypher to the remaining number. Thus to the remainder 14 add 0, and it becomes 140: then say how many times 23 in 140, answer 6; write therefore 6 in the quotient; and from 140 subtract  $6 \times 23$ , or 138, and there will remain 2; to which set a cypher as before; and thus the work being continued at pleasure, there will at length arise this quotient, viz. 208,6086.

**DIVISION of Decimals.** See the article DECIMALS.

**DIVISION**, in algebra, is performed by expunging all the letters that may be found in all the quantities of the dividend and divisor, and dividing the co-efficients of all the terms by any common measure.

Thus if  $10ab + 15ac$  were to be divided by  $20ad$ , the quotient will be  $\frac{2b+3c}{4d}$ ; for by expunging  $a$  out of all the terms, it becomes  $10b + 15c$ , to be divided by  $20d$ ; then dividing all the co-efficients by 5, the dividend is reduced to  $2b + 3c$ , and the divisor to  $4d$ : consequently  $\frac{2b+3c}{4d}$  is the quotient or answer required. And in the very same manner  $2b) ab + bb = \frac{a+b}{2}$ . Again,  $12ab) 30ax - 54ay = \frac{5x-9y}{2b}$ ; and  $4aa) 8ab + 6ac = \frac{4b+3c}{2a}$ ; and, to add no more,  $2bc) 5abc = \frac{5a}{2}$ .

With respect to the signs, if those of the divisor and dividend be like, the sign of the quotient must be +; but if they are unlike, the sign must be -.

Powers of the same root are divided by subtracting their exponents, as they are multiplied by adding them. Thus if  $a^5$  be divided by  $a^2$ , the quotient is  $a^5-2=a^3$ ; and  $b^8$  divided by  $b^2$ , gives the quotient  $b^8-2=b^6$ ; and so in other cases.

If the quantity to be divided is compound, then its parts must be ranged according to the dimensions of some one of its letters, as in the following example. In the dividend  $a^2 + 2ab + b^2$ , they are ranged according to the dimensions of  $a$ , the quantity  $a^2$ , where  $a$  is of two dimensions, being placed first;  $2ab$ , where it is of one dimension, next; and  $b^2$ , where  $a$  is not to be found, last. The divisor  $a+b$  being ranged in the same manner, you are to divide the first term of the dividend by the first term of the divisor; and after setting down the quotient, which in this case is  $a$ , multiply this quotient by the whole divisor, and subtract the product, viz.  $a^2 + ab$  from the two first terms of the

$$\begin{array}{r} a+b) a^2 + 2ab + b^2 (a+b \\ \underline{a^2 + ab} \phantom{+ b^2} \\ ab + b^2 \\ \underline{ab + b^2} \\ 0 \phantom{+ b^2} \\ 0 \end{array}$$

dividend  $a^2 + 2ab$ , and the remainder  $ab$ , together with the last term  $b^2$ , gives a new dividend  $ab + b^2$ . Divide the first term of this new dividend, by the first term of the

divisor, and set down the quotient, which in this example is  $b$ ; then multiplying the whole divisor by this part of the quotient, subtract the product from the new dividend; and if there is no remainder, as is the case here, the division is finished. If there is a remainder, you are to proceed after the same manner till no remainder is left, or till it appear that there will always be some remainder, as in the annexed examples.

**Example I.** without any remainder.

$$\begin{array}{r} 3a-6) 6a^4 - 96(2a^3 + 4a^2 + 8a + 16 \\ \underline{6a^4 - 12a^3} \phantom{+ 4a^2 + 8a + 16} \\ 12a^3 - 96 \\ \underline{12a^3 - 24a^2} \phantom{+ 8a + 16} \\ 24a^2 - 96 \\ \underline{24a^2 - 48a} \phantom{+ 16} \\ 48a - 96 \\ \underline{48a - 96} \\ 0 \phantom{+ 16} \\ 0 \end{array}$$

**Example II.** with a remainder.

$$\begin{array}{r} a+x) a^2 + x^2 (a-x + \frac{2x^2}{a} - \frac{2x^3}{a^2} + \frac{2x^4}{a^3} - \&c. \\ \underline{a^2 + ax} \phantom{+ x^2} \\ -ax + x^2 \\ \underline{-ax - x^2} \phantom{+ x^2} \\ +2x^2 + \frac{2x^3}{a} \\ \underline{+2x^2 + \frac{2x^3}{a}} \phantom{+ x^2} \\ -2x^3 \\ \underline{-2x^3} \phantom{+ x^2} \\ a \\ \underline{-2x^3} \phantom{+ x^2} \frac{2x^4}{a} \\ \underline{a - a^2} \phantom{+ x^2} \\ +2x^4 \\ \underline{+2x^4} \phantom{+ x^2} \\ a^2, \&c. \end{array}$$

In this last example the signs are alternately + and -, the co-efficient is constantly 2, after the two first terms, and the letters are powers of  $x$  and  $a$ ; so that the quotient may be continued as far as you please, without any further division: but in common examples of division, after you come to a remainder of one term, as  $2x^2$ , it is usually set down in the quotient, with the divisor under it, after the other terms; and the quotient in the last example will stand thus;  $a-x + \frac{2x^2}{a+x}$ .



**DIVISION** of an *Idea*, in logick, is an explication of the whole by its several parts; or it is an enumeration of the several parts that go to constitute any whole idea, and render it complete. The special rules for a good division are, that the members of the division entirely exhaust the whole thing divided; that the members of the division be opposite; that sub-divisions should not be too numerous without necessity; nor the members too general; we should in all divisions first consider the larger and more immediate parts of the subject, and not divide it at once into the more remote and minute parts: divide every subject according to the special design you have in view; and, lastly, observe the nature of things with great exactness. But an intimate knowledge of things, and a judicious observation, will better assist division than too curious an attention to the mere formalities of logical writers, without, a real acquaintance with things. *Watts, Locke.*

**DIVISION**, in musick, implies the dividing an octave into a number of smaller intervals, and also a number of notes set to one syllable.

**DIVISION** of *Proportion*. See **PROPORTION**.

**DIVISIONS** of an *Army*, the several brigades into which it is cantoned.

**DIVISIONS** of a *Battalion*, the several corps or parties into which the battalion is divided during the march.

**DIVISION** of a *Fleet*, a certain number of ships belonging to some fleet or squadron, distinguished by a particular flag or pendant, and commanded by a particular officer.

**DIVISOR**, in arithmetick, the number by which another number, called the dividend, is to be divided. See the article **DIVISION**.

**DIVORCE**, a breach or dissolution of the bond of marriage, which, in England, can only be obtained by an act of parliament.

**DIURESIS**, among physicians, implies an excretion of urine.

**DIURETICKS**, in pharmacy, such simples as increase the discharge of urine; or which are supposed to have a power of removing obstructions in the urinary passages. Diureticks must increase the liquor to be secreted in the proper glandules, and are of the five following kinds: the first contains all relaxing and emollient decoctions, emulsions, &c. which do not stimulate, but only remove obstructions, by relaxing the vessels. The second comprehends all those which dissolve and dilute the blood. The third contains three kinds of medicines: 1. All acids which stimulate the vessels. 2. All saline bodies. 3. All fixed and volatile salts. The fourth takes in all that preserve a moderate heat of the body, without sweat. The fifth class contains those whose effects discover themselves about the kidneys and bladder; also all acrid and solvent diureticks.

**DIURNAL**, in astronomy, something relating to the day, in opposition to nocturnal, which regards the night.

**DIURNAL ARCH**, the arch or number of degrees that the sun, moon, or stars, describe between their rising and setting.

**DIURNAL Motion** of a *Planet*, is so many degrees and minutes as any planet moves in 24 hours. Hence the motion of the earth about its axis, is called its diurnal motion.

**DIURNAL** is also used in speaking of what belongs to the nyct-hemeron, or natural day of 24 hours, in opposition to annual, menstrual, &c. The diurnal phenomena of the heavenly bodies, arise from the motion of the earth round its axis.

**DOCK**, in the marine, is a sort of broad deep trench formed on the side of a harbour, or on the banks of a river, and commodiously prepared either for building ships, or receiving them to be repaired, or cleaned on the bottom.

These sort of docks have generally strong flood-gates, to prevent the flux of the tide from entering the dock while the ship is under repair.

There are likewise other sorts of docks, called wet docks, where a ship can only be cleaned during the time of the ebb-tide, or in the interval between the time which the tide left her dry on the ground, and the time it re-

turns to her. These sort of docks have no flood-gates.

**DOCKET**, a little bill tied to wares or goods, directed to the person or place they are to be sent to.

**DOCKET**, or **DOGGET**, in law, signifies a brief in writing, made on a small piece of paper or parchment, containing the purport and effect of a large writing.

**DOCKING** a *Ship*, receiving her into the dock, cleaning the bottom with burning faggots, and daubing it over with a mass of tallow, sulphur, and other ingredients, to make it smooth, that it may the more swiftly glide through the water.

**DOCK-YARDS**, magazines containing all sorts of naval stores; the principal ones in England are those of Chatham, Portsmouth, Plymouth, Woolwich, Deptford, and Sheerness. In time of peace, ships of war are laid up in these places, where such as want repairing are taken into the docks, examined, and refitted for service.

These yards are generally supplied from the northern crowns, with hemp, pitch, tar, resin, and several other species: but as for masts, particularly those of the largest size, they are generally brought from New England.

**DOCTOR**, a person who has passed all the degrees of a faculty, and received an authority from some university, to teach and practise his art.

**DODECAGON**, in geometry, a regular figure consisting of twelve equal sides and angles.

If the radius of a circle, in which the dodecagon is inscribed, be  $= 1$ , then the side of the dodecagon will be nearly .654; and as 1 is to the square of the side of any given dodecagon, so is 2.51956 to the area of it nearly.

**DODECAHEDRON**, is one of the Platonic bodies, or five regular solids, and is contained under twelve equal and regular pentagons.

The solidity of a dodecahedron is found by multiplying the area of one of the pentagonal faces of it by 12; and then this latter product by  $\frac{1}{3}$  of the distance of the face from the centre of the dodecahedron, which is the same as the centre of the circumscribing sphere.

The side of a dodecahedron inscribed in a sphere, is the greater part of the side of a cube inscribed in that sphere, cut in extreme and mean proportion.

If the diameter of the sphere be 1.0000, the side of a dodecahedron inscribed in it will be .35682 nearly.

All dodecahedrons are similar, and are to one another as the cubes of the sides; and their surfaces are also similar, and therefore they are as the squares of their sides; whence, as .509282 is to 10.51462, so is the square of the side of any dodecahedron to the superficies thereof; and as .3637 is to 2.78516, so is the cube of the side of any dodecahedron, to the solidity of it.

**DODECANDRIA**, the name of the eleventh class in the Linnæan system of botany, and comprehends all those plants with hermaphrodite flowers, which are furnished with any number of stamina, from 12 to 19 inclusive. To this class belong agrimony, asarum, heliocardus, refeda, &c.

**DODECATEMORY**, an appellation given to the twelve signs of the zodiack, because each of them contains a twelfth part of the whole. See **SIGN**.

**DODONIAN**, *Dodoneus*, in antiquity, an epithet given to Jupiter, because he was worshipped in a temple built in the forest of Dodona, where was the most famous, and, it is said, the most ancient oracle of all Greece.

**DODRIANS**, in antiquity, three-fourths of the as. See the article **As**.

**DOG**, *Canis*, in zoology, a well known genus of quadrupeds.

*Bite of a mad Dog*, in medicine. See the article **HYDROPHOBIA**.

**DOG**, *Canis*, in astronomy. See **CANIS**.

**DOGE**, the chief magistrate in the republick of Venice and Genoa.

This dignity is elective in both places; at Venice it continues for life, at Genoa it is only for two years. His title is serenity: he is chief of the council, and mouth of the republick.

**DOGGER**, in naval affairs, a Dutch fishing vessel of the northern or German ocean: they are most commonly used in the herring fishery, and are navigated with two masts, viz. a main-mast, and a small mizen-mast.

**DOGS**



**DOGGs** denote iron machines for burning wood on; also hooks fixed in large timbers for drawing them with horses.

**DOGMA**, a principle, maxim, tenet, or settled opinion, or particularly with regard to matter of faith and philosophy.

**DOGMATICAL**, something belonging to a doctrine or opinion. A dogmatical philosopher is one who asserts things positively; in opposition to a sceptick, who doubts of every thing.

**DOGMATISTS**, *Dogmatici*, a sect of ancient physicians, of which Hippocrates was the first author. They are also called *logici*, logicians, from their using the rules of logick in subjects of their profession.

**DOLE**, a Saxon word, implying a part or share; and hence it is still used in some counties to imply a common field, meadow, &c.

**DOLLAR**, a silver coin current in Spain, several parts of Germany and Holland. There are various species of dollars, as the rix-dollar, the semi-dollar, the quarter-dollar, &c. for each of which see **EXCHANGE**.

**DOLPHIN**, in ichthyology, the English name of the delphinus, with an oblong rounded body, and a long acute rostrum. It is considerably longer than the porpus: the opening of the mouth is vastly wide, reaching on each side to the breast; and the fistula or aperture for discharging the water, is in the middle of its head.

**DOLPHIN**, *Delphinus*, in astronomy. See the article **DELPHINUS**.

**DOLPHINS of the Mast**, in naval affairs, a sort of flat wreath of platted cordage, fastened occasionally round the mast as a support to the pudding: the use of it is to prevent the yards of the main or fore-sail from sliding down on the mast, when the ropes which held them up may have been shot away during the time of an engagement. See **PUDDINGS**.

**DOME**, in architecture, a spherical roof, or a roof of a spherical form, raised over the middle of a building, as a church, hall, pavilion, vestibule, stair-case, &c. by way of crowning.

Domes have commonly columns ranged around their outsides, both for the sake of ornament, and support to the work.

**DOME**, or **DOOM**, signifies also a sentence, judgment, or decree.

**DOMESDAY**, or **DOOMS-DAY-BOOK**, a very ancient record made in the time of William the Conqueror, which now remains in the exchequer, and consists of two volumes, a greater and a less; the greater contains a survey of all the lands in most of the counties in England, and the less comprehends some counties that were not then surveyed.

**DOMIFYING**, in astrology, the dividing or distributing the heavens into 12 houses, in order to erect a theme, or horoscope, by means of six great circles, called circles of position.

There are various ways of domifying: that of Regiomontanus, which is the most common, makes the circles of position pass through the intersections of the meridian and the horizon: others make them pass through the poles of the zodiack.

**DOMINATION**, in theology, the fourth order of blessed spirits in the celestial hierarchy, reckoning from the seraphim.

**DOMINICAL Letter**, in chronology, is that letter of the alphabet which points out the Sundays throughout the year; thence also called Sunday-letter.

As the days of the year are placed in a regular series in the almanacks, according to their months; so each day of the week is also distinguished from each other by one of the first seven letters of the alphabet, A, B, C, D, E, F, G; the first of which, A, is placed against the 1st of January; the second, B, against the 2d of January; and so on to the seventh, G, which is placed against the 7th of January; after which the letter A is placed against the 8th, &c. to the end of the year: hence it follows, that whatever letter happens to be placed against any day of any week, the same letter will point out that day throughout the year. Thus, if the 1st of January, against which the letter A is placed, happen to be a Sunday, all days in the calendar which

have an A put to them will be Sundays; and for the same reason, whatever letter stands against the 1st Monday in January, the same letter will point out all the Mondays throughout the year. But because the common year consists of 365 days or 52 times 7 and 1 over; therefore, if the year commence on a Sunday, it will end on a Sunday, and the next year will commence on a Monday; and the Sunday will fall on the 7th of January, to which will be annexed the letter G, which will be the Dominical or Sunday letter for that year; and the next year will commence on a Monday, and consequently the dominical letter will be F; and so on in a continual retrograde order, till it has gone through all the series of letters, and then begins again anew.

But because every fourth year consists of 366 days, hence the series will be interrupted, and the order will not return till after twenty-eight years, or four times seven. And hence arises the cycle of twenty-eight years, generally called the solar cycle, or cycle of the sun: See **CYCLE of the Sun**.

And because, every fourth year, the interclary day is placed between the 23d and 24th of February, which are esteemed, according to our way of reckoning, one and the same day; hence the series of letters is interrupted, and the year has two dominical letters; the first serving till the 24th of February, the other the remaining part of the year.

And hence we have the following general rule for finding the dominical letter, according to the Julian method of computation.

Add to the year its fourth part and 4, and divide that sum by 7, if nothing remains the dominical letter is G; but if there be any remainder, it shews the letter in a retrograde order from G; or, if it be subtracted from 7, you will have the index of the letter from A. Reckoning for 1, A; 2, B; 3, C; 4, D; 5, E; 6, F; and 7, G.

But by the reformation of the calendar under pope Gregory, the order of the dominical letters was interrupted in the Gregorian year: for the year 1582, which at the beginning had G for its dominical letter, by retrenching ten days after the 4th of October, came to have C for its dominical letter; and by having but one dominical letter for the year 1700, therefore the dominical letter of the ancient Julian calendar is four places before that of the Gregorian.—Whence to find the dominical letter, according to the Gregorian year, we must use the following rule:

Divide the year and its fourth part by 7, and subtract the remainder from 7, which will give the index of the dominical letter, as before.

Suppose it were required to find the dominical letter for the year 1778, it will be D.

The given year is	—	1778
Its fourth part	—	444
		————
The sum	—	2222

Which being divided by 7, leaves 3 for the remainder, which subtracted from 7 leaves 4, the index of the letter D.

But because the years 1800, 1900, 2100, 2200, 2300, &c, according to the Gregorian calendar, are of 365 days; and consequently have each but one dominical letter, which, according to the Julian calendar, would have two; therefore the course of the dominical letters will be changed, and consequently this method of finding the dominical letters will only hold good for this century; after which a number must be added to the year and its 4th, in order to find the dominical letters for ever; for which purpose take this rule:

Reject the figures or cyphers to the place of hundreds: divide the remaining figures or cyphers by 4; from this quotient subtract 1; and this number subtracted from the hundred years, and then this last remainder taken from the least number of sevens possible, leaves a number which must be added to the year and its 4th, in order to find the dominical letter.

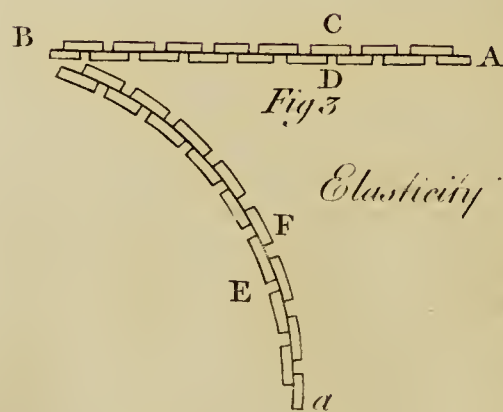
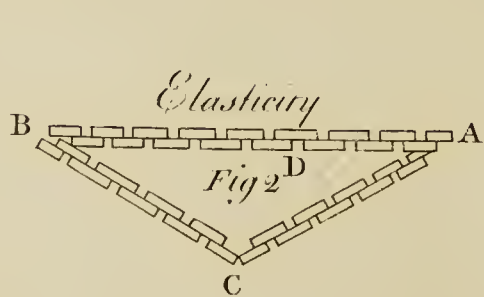
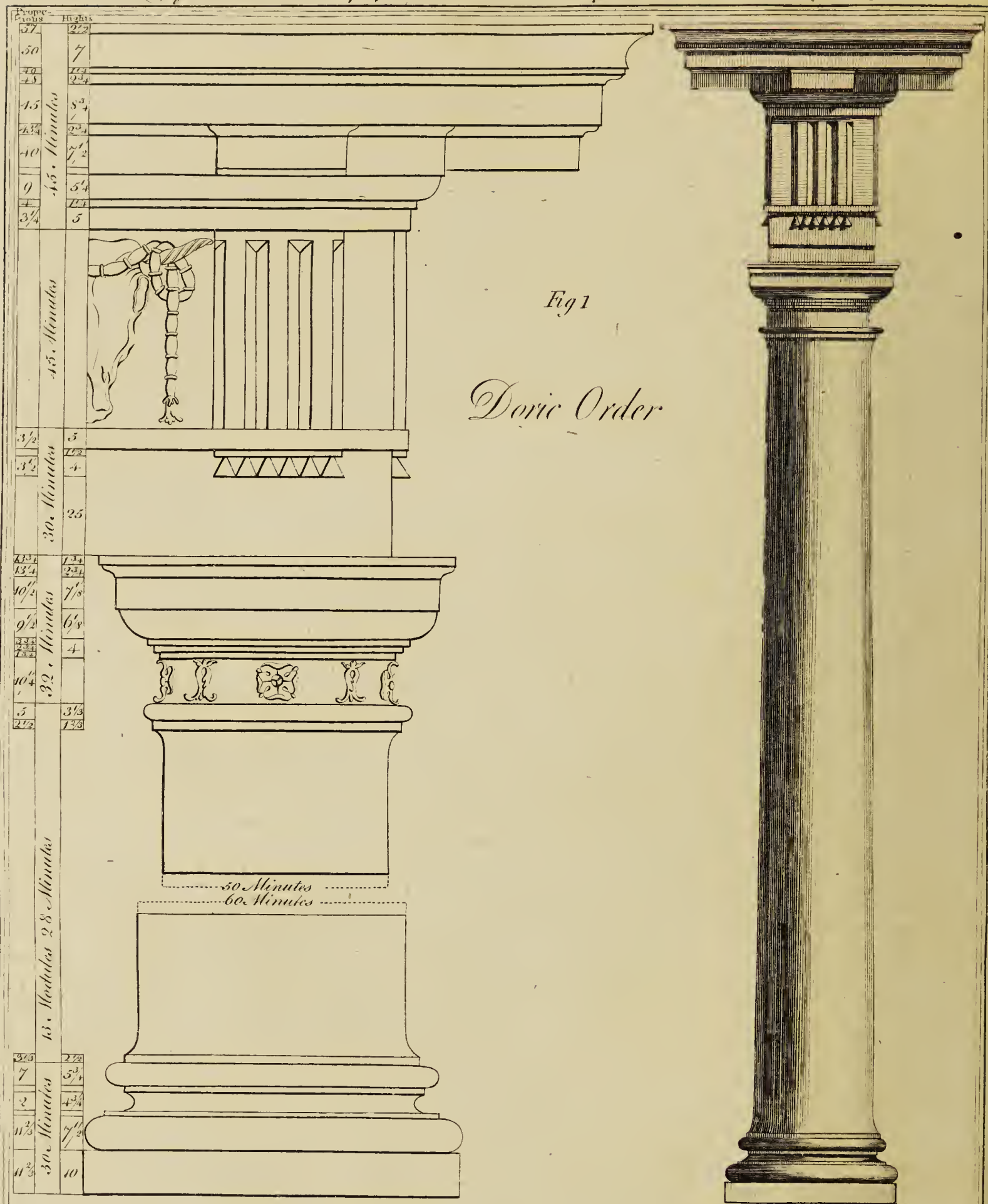
Example. What will be the dominical letter for the year 1842? This question, by the above rule, will be solved in the following manner:

18 ÷ 4 = 4; from which subtracting 1, and the remainder 3 from 18 gives 15; which being subtracted from











from 21, the nearest sevens, gives 6, the number to be added.

Then to the given year = 1842

Add its fourth part = 460

And the number found = 6

2308

Which being divided by 7, gives 329 for the quotient, and the remainder is 5; which taken from 7 leaves 2, the index of the letter B, the dominical letter required.

DOMINICANS are the religious who follow the rule of St. Dominick, called in France Jacobins, on occasion of their principal convent, which is near St. James's gate at Paris, and which, before they became possessed of it in 1218, was an hospital for pilgrims dedicated to the same saint. They are also called friars Predicants, and make one of the four orders of Mendicants. This order is more commonly called Dominicans, being founded by St. Dominick, and approved by Innocent III. in the Lateran council of 1215, and confirmed by Honorius under St. Austin's rule, and the founders particular constitutions. The first monastery of this order was established at Tholouse. They are called Black-friars in England. In 1221 St. Dominick sent Gilbert de Fresnoy, with 12 brothers of the order, into England, where they founded their first house the same year at Oxford. In 1276 the mayor and aldermen of London gave them two streets by the river Thames, where they had a very commodious monastery; whence that place is still called Black-friars. They had likewise monasteries in several other parts of England.

DON, or DOM, is a title of honour, invented and chiefly used by the Spaniards, signifying Sir or my Lord. In Portugal no person can assume the title without the king's permission. In France it is sometimes used among the religious.

DONATION, an act, or contract, whereby one person transfers to another either the property or use of part of his estate or effects.

DONATISTS, a sect of Christian schismatics founded by Donatus, in the beginning of the fourth century. He taught, that baptism administered by hereticks was null; that every church except the African, was become prostituted, and that was to be the restorer of religion.

DONATIVE, a present or gratuity made to any person.

DOOR, in architecture, an aperture to give ingress and egress in and out of any building, or any of its apartments.

DORICK Order, (*plate XXVIII. fig. 1.*) is next in strength to the Tuscan; and being of a grave, robust, and masculine aspect, is by Scamozzi called the Herculean. As it is the most ancient of all the orders, it retains more of the structure of the primitive huts than any of the rest; the triglyphs in its frieze representing the ends of the joists; and the mutiles in its cornice, representing the rafters.

The height of the Dorick column, including its capital and base, is 16 modules, and the height of the entablature four; the latter of which being divided into eight parts, two of them are for the architrave, three for the frieze, and three for the cornice.

In most of the antiques, the Dorick column is executed without a base. Vitruvius likewise makes it without one; the base, according to him, having been first employed in the Ionick order, in imitation of the sandal of a woman's foot. Scamozzi blames this practice, and most of the modern architects are of his opinion.

In the profile of the theatre of Marcellus, the frieze is enriched with husks and roses; the architrave consists only of one fascia and a fillet; the drops are conical; the metope is enriched with a bull's skull, adorned with a garland of beads, in imitation of those on the temple of Jupiter Tonans, at the foot of the capitol. In some antique fragments, and in a great many modern buildings, the metopes are alternately adorned with ox-skulls and pateras. But they may be filled with any

VOL. I. No. 26.

other ornaments, according to the destination of the building.

DORICK *Dialect*, among grammarians, implies one of the five dialects, principally used among the Greeks, particularly the Dorians, after they had retired near Parnassus and Asopus.

This dialect passed afterwards to the Lacedemonians, particularly those of Argos; then to Epirus, Thessaly, Lybia, Sicily, Rhodes, Crete, Tarentum, &c. The authors who have written in this dialect are Archimedes, Archytas, Theocritus, Bion, Pindar, Simonides, Bacchylides, Cypselas, Alcman, and Sophron; also most of the medals of the cities of Græcia Magna favour much of the Dorick dialect in their inscriptions; which shews the countries where it was used.

DORICK *Mode*, in musick, is the first of the authentick modes of the ancients; its character is, to be severe, tempered with gravity and joy, and is proper upon religious occasions, as also in war; it begins D, la, sol, re. Plato judges this musick proper to preserve good manners, as being masculine, and on this account allows of it in his commonwealth.

DORMANT, in heraldry, a term applied to beasts borne in a sleeping posture.

DORMANT-*Tree*, in building, is a name given to a great beam lying across a house, generally called a summer.

DORMER, in architecture, is a window made in the roof of a house, or above the entablature, being raised upon the rafters.

DORMITORY, is a gallery in religious houses or convents, divided into several cells, in which the religious sleep or lodge.

DORSIFEROUS *Plants*, in botany, such as are of the capillary kind, without stalks, and which bear their seeds on the backside of their leaves.

DORSUM, in anatomy, the back or hinder part of the thorax.

DOSE, in pharmacy, a potion, or the quantity of a medicine given at one time.

DOSSIL, in surgery, lint made up into a cylindrick form, and used in dressing cuts, wounds, &c.

DOUBLE *Bastion*, in fortification, is that which has another bastion built higher on it, leaving 12 or 18 feet between the parapet of the lower, and foot of the higher.

DOUBLE *Descant*. See DESCANT.

DOUBLE *Plea*, in law, is that wherein the defendant alleges for himself two several matters in bar for the action, whereof either is sufficient to effect his desire in debarring the plaintiff: and this is not to be admitted in the common law. If a man alledge several matters, the one depending nothing on the other, the plea is accounted double: but, if they mutually depend on one another, then it is accounted but single.

DOUBLE *Point*, in geometry, is one point considered as two infinitely near each other, belonging to geometrical curve lines; or it is an infinitely small oval, whose bounding line is become so very small, as to be taken for two points, distance from each other every way by an infinitely small space.

DOUBLE *Vessel*, in chymistry, is when the neck of one matras is luted in the neck of another.

DOUBLET, among lapidaries, implies a counterfeit stone composed of two pieces of crystal, sometimes of glass, fastened together with paper colours between them, so as to appear the same to the eye, as if the whole substance of the crystal had been tinged with these colours.

DOUBLING, in military affairs, implies the putting two ranks or files of soldiers into one.

DOUBLING a *Cape or Point*, in navigation, implies the sailing round it.

DOUBLINGS, in heraldry, the linings of robes and mantlings in achievements.

DOUBLOON, or DOUBLON, a Spanish and Portuguese coin, being the double of a pistole.

DOUBTING, is the act of the mind debating with itself.

DOUBTING, in rhetoric, expresses the debate of the mind



mind with itself upon any pressing difficulty. A man in perplexity first takes up one resolution, and then lays it aside; afterwards thinks another method more convenient, and then changes again. So that, being to and fro, he scarce fixes at last upon a final determination. This figure keeps the soul in eager attention, and moves all her tenderness for an unhappy sufferer.

DOUCINE, in architecture, is a moulding or ornament on the highest part of the cornice, in the form of a wave, half convex, and half concave. It is the same as a cymatium or gula.

DOVE-TAIL, in carpentry, is a manner of fastening boards or other timber together, by letting one piece into another, in the form of the tail of a dove, from which it takes its name. It is the strongest of all the kinds of joinings or assemblages, wherein the tenon or piece of wood which is put into the other, goes widening to the extreme; so that it cannot be drawn out again, by reason that the extreme or tip is bigger than the hole. It is called by the French queue d'aronde swallow-tail; which name is also used by the English themselves in fortification.

DOWAGER, a widow who enjoys a dower.

DOWER, in law, is that which the wife brings her husband in marriage, called by some maritagium; but it is most commonly taken for that which she hath of her husband, after the marriage is determined, if she outlive him; and this is the third part of all the lands of which the husband was in his life-time actually seized, in an estate of fee-simple or fee-tail.

DOWLE-STONES, in our old writers, the same with land-marks.

DOWRY, *Dos*, is properly the money or fortune which the wife brings her husband in marriage.

DOWRY is also used in a monastick sense, for a sum of money given along with a maid, upon entering her in some religious order.

DOXOLOGY, a hymn frequently used in divine worship, being repeated at the end of every psalm, and other parts of the liturgy used by the church of England.

DRABS, in the salt-works, are a kind of wooden boxes, for holding the salt when taken.

DRACHM, a Grecian coin, worth about sevenpence three-farthings.

DRACHM, is also the name of a weight used by apothecaries, containing three scruples or sixty grains.

DRACO, in astronomy, a constellation of the northern hemisphere containing 80 stars.

DRACO VOLANS, in meteorology, a fiery exhalation, frequent in marshy and cold countries.

It is most common in summer, and though principally seen playing near the banks of rivers, or in boggy places, yet sometimes mounts up to a considerable height in the air, to the no small terror of the amazed beholders; its appearance being that of an oblong, sometimes roundish, fiery body, with a long tail. It is entirely harmless, frequently sticking to the hands, and cloaths of people without injuring them in the least.

DRACŒPHALUM, DRAGON'S-HEAD, in botany, a genus of the didynamia gymnospermia class. The faux of the corolla is inflated, and the superior labium is concave. There are 13 species, none of them natives of Britain.

DRACONARIUS, in antiquity, the person who carried the standards called dragons, from the figures of these animals painted on them. These were in use among the Persians, Parthians, Scythians, Romans, &c.

DRACUNCULI, in medicine, are small, round, white worms, resembling bobbings, found in the hot countries, in the muscular parts of the arms and legs, generally called Guinea-worms.

The surgeons seldom attempt to extract this worm by making an incision; but as soon as they perceive the tumour rise to a competent bulk, they endeavour to bring it to a suppuration with all convenient expedition; and then the head of the worm discovers itself, which they secure, by tying it to a bit of stick or cotton, that it may not draw itself up again: thus they continue to roll it round the stick, sometimes one inch, sometimes two or more, each day, taking great care not to break the worm, else it will be very difficult to

recover the end of it again; and an abscess will be formed, not only at the suppurated part, but likewise through the whole winding of the muscles, where the dead putrifying worm remains, which generally occasions very obstinate ulcers. During the extraction of the worm, the patient should be plied with bitter aloetick and other anthelmintick medicines, in order to dislodge the worm the sooner from its tenement. When the worm is totally extracted, the remaining ulcer may be treated in the same manner as other common ulcers: nor does any further inconvenience remain in the parts of which it had possession. This disease, simply considered, very rarely, if ever, proves mortal.

DRACUNCULI is also used for a disease in children, arising from little worms called by that name. See the article WORM.

DRAGANT. See TRAGACANTHA.

DRAGOMAN, DROGMAN, or DRUGGERMAN, a name given in the Levant to the interpreters kept by the ambassadors of Christian nations residing at the Porte, to assist them in treating of their master's affairs.

DRAGON, *Draco*, in zoology, an animal called also the flying lizard, being furnished with two lateral, membranaceous, and radiated wings: it is a true lizard, with a naked and four-legged body, and a long tail: though there are not wanting some who deny the existence of any such animal.

DRAGONS, *Dracunculus*, in botany, formerly a distinct genus of plants; but now comprehended by Linnæus among the arums. See ARUM.

DRAGON'S Head and Tail, in astronomy, the moon's nodes, or the two points in which the moon's orbit cuts the ecliptick. They are usually denoted by these characters ☾ Dragon's head, and ☿ Dragon's tail.

DRAGON'S BLOOD, *Sanguis Draconis*, in natural history, a moderately heavy resin, of a red colour, brought from the E. Indies. There are two sorts of it; one in small oval drops or tears, of a fine deep red, which is heightened into a crimson on grinding them into powder; the other is in larger masses, apparently composed of tears: of these, some are of a pale dull red, others of a deep one, not at all inferior to the drop sort.

The drops and the lumps are supposed to be the produce of two different trees. The lump sort is said to exude from the trunks of certain palms growing in the Madeira and Canary islands; the drops to be artificially extracted from the fruit of a tree. According to Kempter, the fruit is laid upon a kind of hurdle, over a large vessel half full of water. The whole being lightly covered, the water is made to boil, when the fruit being softened by the steam, a red juice, which was not discoverable in it before, appears upon the surface: this is scraped off upon flag leaves, and exposed to the air to dry. The same author informs us, that some of the preparers of this commodity boil the fruit in water till all the colouring particles are extracted or melted out; after which, the aqueous fluid is evaporated till the remainder begins to thicken, when it is further excicated upon flag leaves as before.

This drug has been sometimes counterfeited with artificial compositions, coloured with the true dragon's blood or Brazil wood: these are distinguished by their either dissolving in water like gums, or crackling, and not burning in the fire.

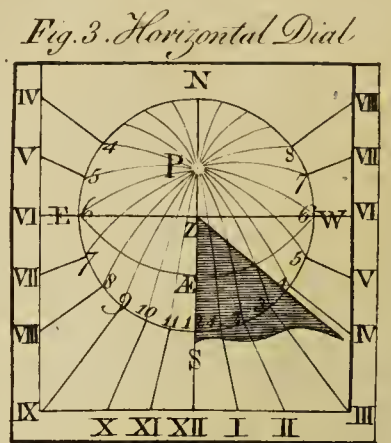
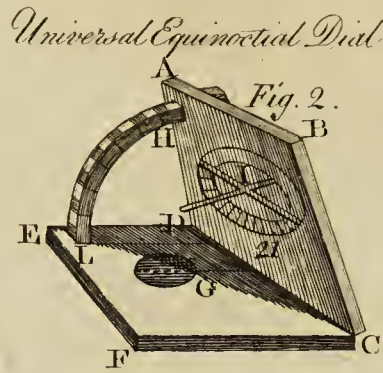
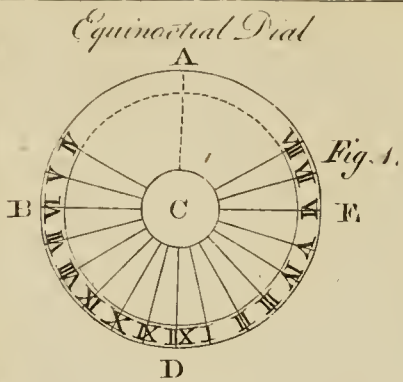
The genuine dragon's blood is not acted upon by water, or at most communicates to it only a slight yellowish tinge: laid on a red hot iron, it readily melts, catches flame, and emits an acid fume approaching to that of benzoin. It dissolves, but not perfectly, in rectified spirit of wine, and tinges a large quantity of the menstruum of an elegant blood-red colour: it dissolves readily in oils, and tinges them of a pretty deep red, but somewhat less beautiful than the colour of the spirituous tincture, and considerably less so than that which anchusa imparts to oil.

The spirituous tincture stains cold marble of a bright flesh colour; to warm marble it gives a deeper red, in proportion to the degree of heat. Mr. du Fay observes that by this one ingredient, with the addition of a little pitch for the darker colours, all the various shades of red may be obtained, from the lightest to the deepest: that

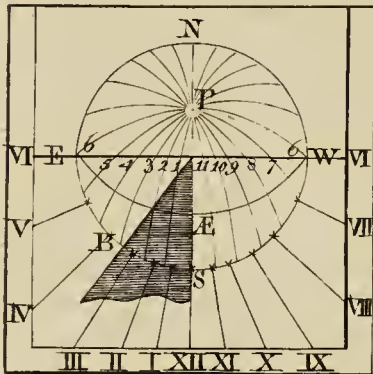




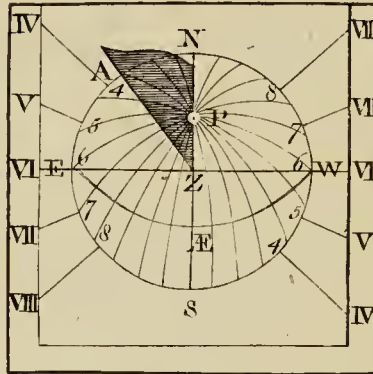




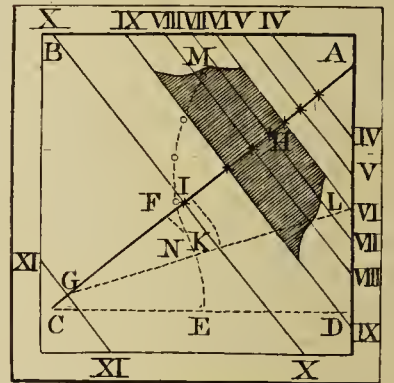
*Fig. 4. South Vertical Dial*



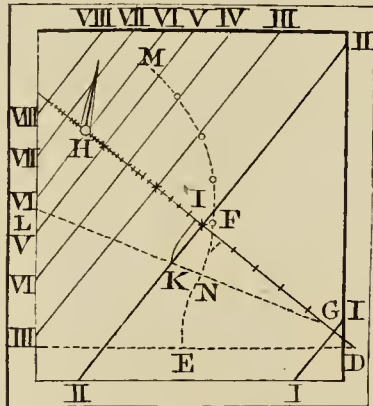
*Fig. 5. North Vertical Dial*



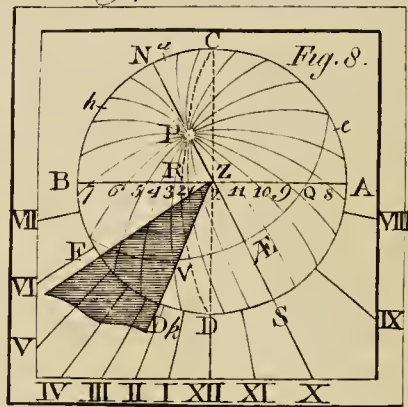
*Fig. 6. East Vertical Dial*



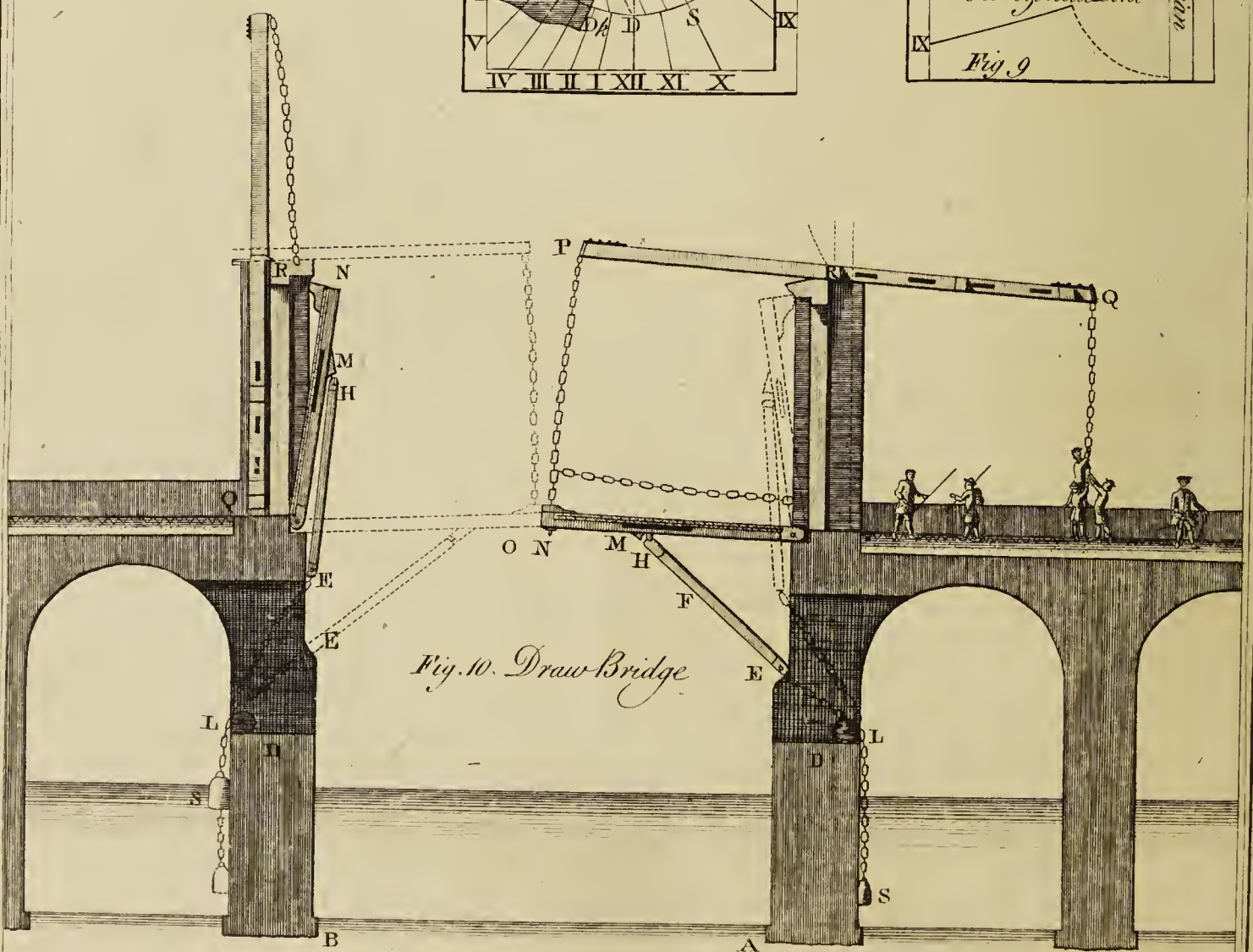
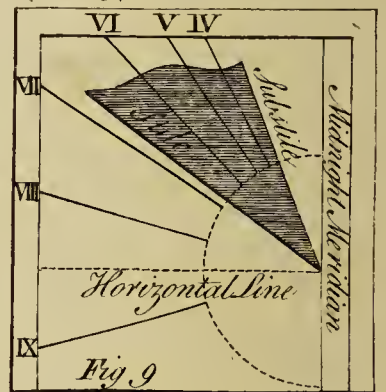
*Fig. 7. West Vertical Dial*



*Declining from Stowards E Dial*



*Declining from N towards E Dial*





that it does not sink near so far into cold as into hot marble: and that the not sinking is rather an advantage than an imperfection, as the colours which sink must also spread, so as to render the drawing of fine designs impracticable; that the best way of obtaining beautiful reds from dragon's blood is, to put the powdered resin into spirit of wine over the fire, and apply on the marble with a pencil, the finer part of the solution which rises up about the sides of the vessel, adding fresh spirit in proportion to the evaporation, till the dragon's blood yields no more tincture.

This resin, in substance, has no smell or taste: when dissolved, it discovers a slight degree of pungency. It is usually looked upon as a gentle incrassant, desiccative, and restringent: and sometimes prescribed in these intentions against alvine and uterine fluxes, and ulcerations both internal and external.

DRAGONNEE, in heraldry, a lion dragonnée is where the upper half resembles a lion, the other half going off like the hinder part of a dragon. The same may be said of any other beast as well as a lion.

DRAGOONS, in military affairs, a kind of soldiers who act on horseback, but generally fight on foot, they are posted in the front of the camp, and march first to the charge.

As infantry, they have serjeants; and as cavalry, cornets. Their arms are, a sword, firelock, pistols, and bayonet; and, when they march on foot, their officers bear the pike, and the serjeant the halbert.

DRAIN, a trench or sewer for carrying off superfluous water.

DRAINING of *Lands*. See the article FEN.

DRAMA, a poem containing some certain action, and representing a true picture of human life, for the delight and improvement of mankind.

The principal species of the drama are two, comedy and tragedy. Some others there are of less note, as pastoral, satire, tragi-comedy, opera, &c.

DRAMATICK, an epithet applied to any thing belonging to the stage.

DRAPERY, in painting and sculpture, the representation of the garments or cloathing of human figures, as also hangings, tapestry, curtains, and most other things that are not carnations or landscapes.

The art of drapery consists chiefly in the order of the folds or plaits, the different quality of the stuffs, and the variety of their colours.

M. de Piles observes, that the first effect of drapery, and that which the painter ought principally to have in view, is, that it express the thing it is supposed to cover. 2. That it must never be made to stick to the parts of the body, 3. That a great likeness and motion of the drapery are only proper in figures in great agitation or exposed to the wind. 4. That the nudities of the figures should always be designed, before the painter proceeds to the drapery.

DRASTICK, in physick, an epithet applied to such medicines as are of present efficacy, and powerful in operation; and is commonly applied to emeticks and catharticks.

DRAUGHT, in trade, called also CLOFF or CLOUGH, is a small allowance on weighable goods, made by the king to the importer, or by the seller to the buyer, that the weight may hold out, when the goods are weighed again.

The king allows one pound draught for goods weighing less than 1 Cwt. two pounds for goods weighing between 1 and 2 Cwt. three pounds for goods weighing between 2 and 3 Cwt. four pounds from 3 to 10 Cwt. seven pounds from 10 to 18 Cwt. nine pounds from 18 to 30 Cwt. or upwards.

DRAUGHT, or DRAFT, in architecture, the form of an intended building, drawn on vellum, or paper; containing the several divisions and partitions of the apartments, doors, windows, &c. in their true proportion.

DRAW-BACK, in commerce, a rebate or discount upon the price of commodities purchased on certain conditions; also the repayment of money to an importer of some part or the whole custom paid for importing goods, on condition of his exporting them again.

DRAW-BRIDGE, a bridge made after the manner of a floor, to draw up, or let down, as occasion serves, before the gate of a town or castle. See BRIDGE.

A draw-bridge may be made after several different ways, but the most common are made with plyers, twice the length of the gate, and a foot in diameter. The inner square is traversed with a cross, which serves for a counterpoise; and the chains which hang from the extremities of the plyers to lift up or let down the bridge, are of iron or brass.

In navigable rivers it is sometimes necessary to make the middle arch of bridges with two moveable platforms, to be raised occasionally, in order to let the masts and rigging of vessels pass through. This kind of draw-bridge is represented in (*plate XXIX. fig. 10.*) where A B is the width of the middle arch; A L and B L, the two piers that support the draw-bridge N O, one of the platforms of which is raised, and the other let down, having the beam P Q for its pleyer. To N O are suspended two moveable braces E H, E H, which, resting on the support E, press against the bracket M, and thereby strengthen the draw-bridge. These braces are conducted to the rest by means of the weight S, pulling the chain S L E.

DRAWING, an acquired habit of representing the appearances of objects by imitation or copying, without the assistance of mathematical rules; and must be gained by long practice and diligent observation.

This art hath some resemblance to that of writing, where the learner is first taught to imitate the shapes of the letters, then to join them into syllables and words, and being possessed of these first rudiments, attains by practice a freedom and neatness of hand to transpose, combine, vary, adorn, and flourish them according to his fancy. After the like manner a young designer first learns to draw the resemblance of the easiest objects, and thence proceeds to the most difficult: he begins with an eye, a nose, or other single feature; then a hand, a foot, and other limbs, which he afterwards puts together to complete an entire figure; and being master of all the different parts of the body as of so many different characters, he learns to combine them in several postures, and thence by degrees to compose groups of figures in proper attitudes. The same method he pursues with regard to other visible objects, animate and inanimate; and having thus provided himself with a sufficient stock of particulars, is enabled to introduce all the variety he thinks proper for the execution of a more extensive design.

DREDGE, or DREG, among farmers, denotes oats and barley mingled together.

DREDGERS, the term used in the admiralty-court for the oyster-fishers.

DREIN, in the military art, a trench made to draw the water out of a moat, which is afterwards filled with hurdles and earth, or with fascines, or bundles of rushes and planks, to facilitate the passage over the mud. See the article TRENCHES.

DRENCH, among farriers, a physical potion for horses. The ingredients for this purpose are to be beat coarsely, and either mingled with a decoction, or with wine. Then let all infuse about a quarter of an hour, and give it to the horse with a horn, after he has been tied up two hours to the rack.

DRESSING of *Hemp and Flax*. See the article HEMP and FLAX.

DRESSING of *Hops*. See HOPS.

DRESSING of *Ores*, the breaking and powdering them in the stamping-mill, and afterwards washing them in a wooden trough.

DRESSING, in surgery, the treatment of a wound or any disordered part. The apparatus of dressing consists of dossils, tents, plasters, compresses, bandages, bands, ligatures, and strings.

DRIFT of the *Forest* is an exact view and examination taken at certain times to know what beasts are there, in order that none may come on the forest but such as have right; and that the forest be not overcharged with beasts.

DRIFT, in mining, a passage cut out under the earth, betwixt shaft and shaft, or turn and turn; or a passage



or way, wrought under the earth, to the end of a meer of ground, or part of a meer.

**DRIFT**, in navigation, the line upon which a ship drives in a storm with her side to the wind, when it blows so violent as to prevent her from being able to carry any sail, or only enough to keep her sufficiently inclined to one side, that she may not carry away her masts by violent rocking: or, drift is the angle which the line of her motion makes with the keel in such a situation when her prow is in the middle between the points of the compass, to which she comes up and falls.

**DRIFT** of a *Current*, in navigation: See **CURRENT**.

**DRILL**, in mechanicks, a small instrument for making such holes as punches will not conveniently serve for.

Drills are of various sizes, and are chiefly used by smiths and turners.

**DRILL**, or **DRILL-PLOUGH**, a name given to an instrument for sowing land in the new method of horse-hoeing husbandry. It plants the corn in rows, makes the channels, sows the seed in them, and covers them with earth when sown; and all this at the same time, and with great expedition. The principal parts are the seed-box, the hopper, the plough and its harrow, of all which the seed-box is the chief. It measures, or rather numbers, out the seed, which it receives from the hopper, and is for this purpose an artificial hand, but it delivers out the seed much more equally than can be done by a natural hand. See **PLOUGH**.

**DRINK**, a part of our ordinary food in a liquid form, serving to dilute and moisten the dry meat.

**DRIPS**, in architecture. See **LARMIER**.

**DRIVER**, in naval affairs, signifies an oblong sail hoisted occasionally at the mizzen-peak, when the wind is fair; the lower corners of it are extended by a boom or pole, thrust out across the ship, over the quarter.

**DROCK**, in husbandry, the upright piece of timber on the right side of the plough's tail, to which the earth-board is fixed.

**DROMEDARY**, a large animal of the camel kind, common in the eastern countries, particularly Asia, where it is generally used for riding on, sometimes as a beast of burden.

**DRONE**, in natural history of insects, is a name given to the male bee from its idleness. See the article **BEE**.

**DROPS**, in architecture, imply an ornament in the Dorick entablature, representing drops or little bells, placed immediately under the triglyphs.

**DROPS**, in medicine, a liquid remedy, whose dose is estimated by a certain number of drops.

**DROPSY**, in medicine, an unnatural collection of waters in any part of the body.

Among the various causes of this disease may be reckoned a family or constitutional disposition thereto; a hasty drinking cold water in too large quantities; a stoppage of the natural discharges of perspiration and urine; a lenterious disorder of long continuance; all obstinate obstructions of the viscera; the jaundice, diarrhoea, dysentery, coeliac passion, and gout; drinking sharp, fermented, and spirituous liquors, and the like.

As to the symptoms, the feet and legs first swell; and when these are distended to the utmost, the waters rush into the abdomen, and cause it to swell by little and little; till at length the more noble viscera are affected thereby, and the patient is soon overwhelmed with the deluge. In proportion as the diseased parts increase in bulk, the rest fall away; and at the same time, the difficulty of breathing, and other symptoms grow more intolerable.

When the abdomen is swelled, it will resound when struck, if the disease be a tympany; and if an ascites, the noise of the fluctuating waters is heard. Besides these symptoms, the patient is also afflicted with a heaviness, stupor, costiveness, and at length with a slow fever. The waters too, after being long pent up in a close place, grow acrimonious; and hence ulcers, gangrenes, bleeding at the nose, a mortification of the viscera, and death.

In the anasarca, as well as in the more advanced stages of a dropsy, the chief indications of cure, are to restore the humours to their natural fluidity, invigorate the languid circulation, brace up and strengthen the relaxed solids, promote the secretions, and carry off the

redundant stagnating juices. To this purpose, drastring purges, steel-medicines, absorbents, detergents, and stomachicks are recommended. A brisk purge should be taken early every morning, or every other day, according to the strength of the patient, till the swelling of the parts affected abate.

Elaterium, and antimonial wine, are said to be excellent for dropical patients, who are not easily purged; two grains of the former being a proper dose for most constitutions; and of the latter, antimonial wine, a dram and a half, or two drams, may be taken every morning; this frees the abdomen from the load of waters. Some greatly recommend Bontius's pills, the dose of which is from half a scruple to a scruple. Mercurius dulcis, and the juice of the root of iris palustris lutea are also recommended: eight drops of this last may be given every hour in a little sirup of buck-thorn.

As to catharticks, the slow ones are rather hurtful than beneficial; and therefore, the purge had better be too strong than too weak, that the waters may be carried off with as much speed as the patient's strength will bear. When the patient is of a very weakly constitution, it is proper to omit all purgatives, and give diureticks and the lixivial salts in their stead, especially nitre. Some also have been cured by a pertinacious abstinence from all liquids, excepting a little rich wine.

When the waters are by these means carried off, the tone of the debilitated viscera should be restored by the use of wines, steel, and such strengtheners as act by their astringency: purging must therefore be omitted, but other strengtheners may be used occasionally.

**DROPPWORT**, in botany. See **FILIPENDULA**.

**DROWNING**, the act of suffocating, or being suffocated with water.

In order to recover a person that has been drowned, the great intention to be pursued is to put the solid parts of the machine in action, that thus they may restore the motion of the fluids. In order to this, the drowned person should be agitated in a hundred different positions in bed, in the arms of persons of sufficient strength.

Spirituous liquors should be poured into his mouth; and when these cannot be had, warm urine, which has been observed to produce happy effects. Some prescribe a decoction of pepper and vinegar, as a gargilism.

We must also attempt to irritate the internal fibres of the nose, either by volatile spirits and the liquors used in apoplectick cases, or by tickling the nerves of the nostrils with a bearded feather, or by blowing through a quill snuff or some more powerful sternutatory.

One of the means taken with such as have been restored to life, has been by a quill, or small pipe to blow warm air into their mouths, in order to be conveyed to their intestines, into which it has been successfully introduced by a pair of bellows. For this a syringe may be used, which perhaps might be better employed in injecting warm clysters capable of irritating the intestines, and producing more considerable effects than the air generally conveyed to them.

Perhaps the most efficacious method is by means of a pipe to blow the smoke of tobacco into their intestines; of the happy effects of which there have been several instances.

None of all these measures specified ought to be neglected, since they may possibly concur to produce a salutary effect, especially when under the inspection of a judicious physician. Venesection is by no means to be neglected, and perhaps most commodiously in the jugular vein; for in drowned persons, as well as in those that have been hanged, or seized with an apoplectick fit, the veins of the neck are too much distended and choaked with blood. Now, if these can be emptied in some measure, they will be more capable of acting upon the fluid they contain, and which, in order to restore the patient, they ought to put in motion.

When these measures prove unsuccessful, the last recourse is bronchotomy, or opening the arteria trachea; for perhaps the air entering freely through the aperture into the lungs, and the warm air which may be blown through it, will restore the playing of the lungs, and all the motions of the breast. But we should not be discouraged, if the first appearances do not answer expectation; for it is certain from experience, that



some drowned persons have not begun to discover any signs of life, till they have been tossed about and tormented for more than two hours. *Brubier.*

There has been a society lately instituted for the recovery of persons apparently dead by drowning, called, *The Humane Society*; by whose endeavours, with the blessing of God, numbers have been restored to life again.

DRUG, a general name for all the commodities used in pharmacy, dying, &c. brought from distant countries.

DRUGGET, in commerce, a stuff sometimes all wool, and sometimes half wool half thread, sometimes corded, but usually plain.

Those that have the woof of wool, and the warp of thread, are called threaded druggets; and those wrought with the shuttle on a loom of four marches, as the serges of Moui, Beauvois, and other like stuffs, corded, are called corded druggets. As to the plain, they are wrought on a loom of two marches, with the shuttle, in the same manner as cloth, camblets, and other like stuffs, not corded.

DRUIDS, the priests or ministers of religion of the ancient Britons, and Gauls.

The Druids were chose out of the best families; and were held, both by the honours of their birth, and their office, in the greatest veneration. They are said to have understood astrology, geometry, natural history, politicks, and geography: they had the administration of all sacred things, were the interpreters of religion, and the judges of all affairs indifferently.

Whoever refused obedience to them, was declared impious and accursed: they held the immortality of the soul, and the metempsychosis; they are divided by some into several classes, as the Vaceni, Bardi, Semothii, &c. they had a chief, or arch-druid, in every nation: he was a sort of high-priest, having an absolute authority over the rest, and was succeeded by the most considerable among his survivors. The youth used to be instructed by them, retiring with them to caves and desolate forests, where they were sometimes kept twenty years. They preserved the memory and actions of great men by their verses; but are said to have sacrificed men to Mercury. Cæsar imagined that the Druids came from Britain into Gaul, but several among the modern writers are of a different opinion.

DRUM, in military affairs, is an instrument used principally among the foot to call the soldiers together, direct their marches, attacks, and retreats. It consists of a very thin piece of oak bent into a cylinder, and covered with parchment, which is strained or braced more or less by means of strings, and struck with sticks. Its height is equal to its breadth, which does not exceed two feet and a half. There are also drums whose bodies are brass, called tymbals or kettle-drums, used among the horse. They are laid across the shoulders of the horse before the drummer, who, with a variety of odd gestures, beats them with two little iron bars round at the ends. These are often used in opera's, oratorio's, tragedies, and concerts. There are divers beats of the drum, as a march, double march, assembly, charge, retreat, chamade, &c.

DRUM, *Tympanum*, in anatomy. See the article EAR.

DRUPE, among botanists, a kind of pericarpium, consisting of a soft, fleshy and succulent pulp, with a nucleus or kernel in the centre.

DRYADES, in the heathen theology, are nymphs of the woods; a sort of imaginary deities that were thought to inhabit the woods and groves, and to hide themselves under the bark of the oak, or any other tree; called by the Greeks *δρυς*; from which the word is derived.

They differed from the Hamadryades, these latter being attached to some particular tree, with which they were born, and with which they died. We likewise find mention made of a kind of prophetesses or witches among the Gauls, called Dryades, or perhaps Druides.

DUCAL, is any thing belonging to a duke. The letters patent granted by the senate of Venice are called Ducals, as at the beginning of these the name of duke is written in capitals: and so are the letters called that are written, in the name of the senate, to foreign princes.

DUCAT, a piece of coin, current in Hungary and

Poland, for 9 shillings and 3 pence; at Rome and Venice, a single ducat is nearly the same.

DUCATOON, a silver coin, struck chiefly in Italy; though there are also Dutch and Flemish ducatoons.— Their value is about 4 shillings and 8 pence sterling.

DUCK, the name of a well known fowl, very necessary for the husbandman's yard, as they require no charge in keeping; for they live on lost corn, snails, &c. for which reason they are very proper for gardens. Once in the year they lay a great number of eggs, especially a sort of duck which turns up its bill more than the common kind. When they sit they require no attendance, except they have a little barley or offal corn near them, that they may not straggle far from their nests to chill their eggs. They are reckoned to be better hatched under a hen than a duck; because while they are young the hen will not lead them so often into the water. Some reckon it very proper to cut off the feathers from their rumps; because when their tails are wet, it often occasions their drowning. As to the fattening of them, you may do it in three weeks time, by giving them any kind of corn or grain, and plenty of water. Ground malt, wet either with milk or water, is best.

DUCT, *Ductus*, in anatomy, a canal or pipe applied to several parts of the body, through which fluids are conveyed.

DUCTILITY, in philosophy, a property of certain bodies, which renders them capable of expanding or stretching under the hammer, press, &c.

Some bodies are remarkably ductile, especially gold. See the article DIVISIBILITY.

DUEL, a single combat, at a time and place appointed, in consequence of a challenge.

This custom came originally from the northern nations, among whom it was usual to decide all their controversies by arms. Both the accuser and accused gave pledges to the judges on their respective behalf; and the custom prevailed so far amongst the Germans, Danes and Franks, that none were excused from it but women, sick people, cripples, and such as were under twenty-one years of age, or above sixty. Even ecclesiasticks, priests and monks, were obliged to find champions to fight in their stead. The punishment of the vanquished was either death, by hanging or beheading; or, mutilation of members, according to the circumstances of the case. Duels were at first admitted, not only on criminal occasions, but on some civil ones for the maintenance of rights to estates, and the like: in latter times, however, before they were entirely abolished, they were restrained to these four cases: 1. That the crime should be capital. 2. That it should be certain the crime was perpetrated. 3. The accused must, by common fame, be supposed guilty. And 4. The matter not capable of proof by witnesses. In England, though the trial by duel is disused, the law on which it is founded is still in force. See CHAMPION.

DUEL, at present, is used for a single combat on some private quarrel, and must be premeditated, otherwise it is called a rencounter. If a person be killed in a duel, both the principals and seconds are guilty of murder, whether the seconds engage or not. It is also a very high offence to challenge a person, either by word or letter, or to be the messenger of a challenge. The severe edicts made by Lewis XIV. against duels, have in a great measure put a stop to the custom in France.

DUKE, is either the title of a sovereign prince, as the duke of Savoy, Parma, &c. or the title of nobility next below sovereign princes.

DULCIFYING, in pharmacy, the sweetening, or rendering insipid, any matter impregnated with salts, by washing them in common water.

DULEDGE, in gunnery, a peg of wood with joints at the ends of the six fellows that form the circumference of the wheel of a gun's ridge. The iron plate on the outside of the wheel which strengthens the joint is called the dyledge plate.

DUN, a colour partaking of brown and black.

DUNG, the excrements of animals, putrified vegetables, &c. used in improving land.



Dungs are intended either to repair the decay of exhausted worn-out lands, or to cure the defects of other soils, which are as various in their qualities as the dungs used to meliorate or restore them. Some lands are too cold, moist, and heavy; whilst others are too light and dry. To answer this, some dungs are hot and light, as that of horses, sheep, pigeons, &c. Others again are fat and cooling, as that of oxen, cows, hogs, &c. And as the remedies which are used must be contrary to the distempers they are to cure, so the dung of oxen, cows, and hogs should be applied to lean, dry, light earths, to make them fatter and closer; and hot and dry dungs to cold, moist, and heavy lands.

Dung has two peculiar properties. The one is to fatten the earth, and render it more fruitful; and the other, to produce a certain sensible heat, capable of causing some considerable effect; which last is seldom found but in the dung of horses and mules, while it is newly made, and a little moist.

DUNG-MEERS, in husbandry, places where soils and dungs are mixed and digested together. For this purpose it is usual to dig a pit sufficient to hold the stock of soil the husbandman is capable of making; and to prepare it at the bottom with stone and clay, that it may hold water, or the moisture of the dung; and besides, it should be so situated that the sinks and drips of the houses and barns may run into it. Into this pit they cast refuse-fodder, litter, dung, weeds, &c. where they lie and rot together till the farmer have occasion for it. Where such a pit is wanting, it is proper to cover the dung with turf, or other stuff, to prevent the sun and wind from drawing off its virtues.

DUO, in musick, a song or composition to be performed in two parts only, one sung, the other played on an instrument, or by two voices.

Duo, is also when two voices sing different parts, as accompanied with a third, which is a thorough base. It is seldom that unisons and octaves are used in duos, except at the beginning and end.

DUODENUM, in anatomy, the first of the small guts, intestina tenuia, so called from its length, which is about twelve fingers breadth. It has its origin at the pylorus, or right orifice of the stomach; from which ascending a little, it afterwards descends again, and towards its end re-ascends, and runs transversely towards the left kidney: at the distance of three or four fingers from the pylorus it receives, at one prominent hiatus or mouth, the choledochick and pancreatick ducts, which discharge their respective liquors into it. The coats of the duodenum are thicker than those of any other of the small guts, and its cavity is also greater than that of any of them. Near its origin it has no valves, nor rugæ or wrinkles; but in its continuation it has very numerous and remarkable ones, called by authors juga. It has also the glands of Brunnerus in great number, which serve for the secreting of a thin aqueous fluid: and it receives an artery from the cœliack, and a vein from the porta.

DUPLE, among mathematicians, denotes the ratio of 2 to 1. Thus the ratio of 8 to 4 is duplc, or as 2 to 1.

Sub-DUPLE RATIO, is just the reverse of the former, or as 1 to 2. Such is 4 to 8, or 6 to 12.

DUPLICATE, among lawyers, denotes a copy of any deed, writing, or account. It is also used for the second letters patent, granted by the lord chancellor in a case wherein he had before done the same.

Duplicate Ratio, is a ratio compounded of two ratios; as the duplicate ratio of  $a$  to  $b$  is the ratio of  $aa$  to  $bb$ , or the square of  $a$  to the square of  $b$ .

In a series of geometrical proportionals, the first term to the third is said to be a duplicate ratio of the first to the second: thus, in 2, 4, 8, 16, the ratio of 2 to 8 is duplicate of that of 2 to 4; so that duplicate ratio is the proportion of squares, as triplicate is of cubes, &c. and the ratio of 2 to 8 is said to be compounded of that of 2 to 4, and of 4 to 8.

DUPLICATION, is the doubling of any thing, or multiplying of it by 2: it is also the folding of any thing back again on itself.

DUPLICATION of the Cube, is to find the side of a cube that shall be double in solidity to a given cube. Several have attempted to do this geometrically; but it is in vain to pretend to it, for it cannot be done without the solution of a cubick equation: and so a conick section, or some higher curve, must be used for determining the problem.

The solution of this problem depends upon finding two mean proportionals between two given lines. For if the side of a given cube be  $=a$ , and the side of a double cube be  $=y$ , then will  $2a^3=y^3$ ; or, putting  $b=2a$ , it will be  $aaab=y^3$ ; therefore it will be  $aa:yy::y:b$ ; or, making  $z=\frac{yy}{a}$ , it will be  $a:z::y:b$ ;

so that these four quantities will be continual proportionals: consequently  $y$ , the side of the cube sought, is the second of two mean proportionals between  $a$  and  $b$ .

This problem of doubling the cube was first proposed by the oracle at Delphos, to the inhabitants of Delos, who going thither to ask what was to be done in order to stop the plague which then raged in that island; it returned for answer, that on their doubling the altar of Apollo, which was a perfect cube, the plague should cease.

DUPLICATURE, in anatomy, is the doubling of any membranes, when they run off to some distance, and return again.

DUPONDUS, in antiquity, the weight of two pounds; also a piece of money equal to two as's in value.

DURA Mater, or Meninx, in anatomy, the name of a thick external membrane, which covers the brain. See the article BRAIN.

DURATION, is the idea which we have of the continuation of the existence of any thing, being the same with time, when mathematically and absolutely considered; but the vulgar time is the measure of this duration, taken from the motion of the heavenly bodies, &c.

Mr. Locke defines duration to be the idea which we get by attending to the fleeting and perpetually perishing parts of succession.

DUTCHY, in geography, the dominions of a duke.

DUTY, in general, denotes any thing that one is obliged to perform.

Duty, in polity and commerce, signifies the impost laid on merchandizes, at importation and exportation, commonly called the duties of customs; also the taxes of excise, stamp-duties, &c. See the articles CUSTOMS, EXCISE, &c.

The principles on which all duties and customs should be laid on foreign merchandizes, which are imported into these kingdoms, are such as tend to cement a mutual friendship and traffick between one nation and another; and therefore, due care should be taken in the laying of them, that they may answer for good an end, and be reciprocal in both countries: they should be so laid as to make the exports of this nation at least equal to our imports from those nations wherewith we trade, so that a balance in money should not be issued out of Great-Britain, to pay for the goods and merchandizes of other countries; to the end that no greater number of our landholders and manufacturers should be deprived of their revenues arising from the product of the lands, and the labour of the people, by foreign importations, than are maintained by exportations to such countries. These are the national principles on which all our treaties of commerce with other countries are to be grounded.

Duty, in military affairs, implies all the services belonging to the function of a soldier, except marching to meet and fight the enemy, which is called going on service.

DUUMVIRATE, the office or dignity of the duumvirii. See the next article.

The duumvirate lasted till the year of Rome 388, when it was changed into a decemvirate.

DUUMVIRI, in Roman antiquity, a general appellation given to magistrates, commissioners, and officers, where two were joined together in the same functions.



DWAL, in heraldry, the herb night-shade, used by those who blazon with flowers and herbs, for black or sable.

DWARF, a general appellation for things greatly inferior in size to what is usual in their several kinds.

DWARF-TREES, those which are less than the common sorts of the same genus.

Dwarf-trees were formerly in much greater request than they are at present; for though they have some advantages to recommend them, yet the disadvantages attending them greatly over-balance; and since the introducing of espaliers into English gardens, dwarf-trees have been in little esteem.

DWARF-OAK, the name of a shrub common in many parts of North America, where it is planted for making hedges and fences. It grows very fast, and becomes so thick by cutting with sheers, that hardly a bird or mouse can creep through it when in full perfection. The acorns are sown in rows or drills, where the hedge is proposed to be made, which admits of being made of a considerable height. Such a fence as this would be a screen from the winds in winter, as well as a security to the inclosure; and therefore a hedge of this kind would be very useful here: and the plant would, perhaps, on further examination, be found capable of being serviceable in some other ways.

DYADICK *Arithmetick*, the same with binary arithmetick. See the article BINARY ARITHMETICK.

DYE, in architecture, that part of the pedestal included between the base and the cornice.

It also implies a cube of stone, placed under the feet of a statue.

DYEING, the art of giving a lasting colour to silks, cloths, and other substances, whereby their beauty is much improved, and value enhanced.

This art depends chiefly on three things, viz. 1. Disposing the surface of the stuffs to receive and retain the colours, which is performed by washing them in different lyes, digesting, beating them, &c. in which human urine putrified, a sharp salt of ashes, divers soaps, and galls of animals, are of principal use; by means whereof the viscous gluten of the silk-worms naturally adhering to their threads, is washed and cleansed from them, and thus they become fitted gradually to imbibe the colours. By these also the greasy foulness adhering to wool and flax is scoured off. See CLOTH.

2. So to grind the colours, as that they may enter the body duly prepared, and preserve their beauty undiminished.

3. The third consists in having beautiful colours.

According to Sir W. Petty's account of what is done in particular trades by the art of dyeing, 1. There is a whitening of wax, and several sorts of linen and cotton cloths, by the sun, air, and reciprocal effusions of water. 2. Colouring of wood and leather, by lime, salt and liquors, as in stoves, canes, and marble leathers. 3. Colouring of paper, viz. the marbled paper, by distempering the colours with ox-gall, and applying them upon a stiff gummed liquor. 4. Colouring, or rather discolouring, the colours of silks, tiffanies, &c. by brimstone. 5. Colouring of several iron and copper works into black with oil. 6. Colouring of leather into gold colour, or rather silver leaves into gold by varnishes, and in other cases by urine and sulphur. 7. Dyeing of marble and alabaster, with heat and coloured oils. 8. Colouring silver into the brass-colour with brimstone or urine. 9. Colouring the barrels and locks of guns into blue and purple, with the temper of small-coal heat. 10. Colouring of glass (made of sands, flints, &c.) as also of crystals and earthen ware, with the rusts and solutions of metals. 11. The colouring of live hair, as in Poland, horse and man's hair; as also the colouring of furs. 12. Enamelling and annealing. 13. Applying colours, as in the printing of books and pictures, and as in making of playing cards, being each of them performed in a different way. 14. Gilding and tinning with mercury, block-tin, sal ammoniac. 15. Colouring of metals, as copper with calamy, into brass, and with zink or spelter into a golden colour, or into a silver one with arsenick; and of iron into a resemblance of copper, with Hungarian vitriol. 16.

Making of painters colours, by preparing of earth, chalk and flates; as an umber, ochre, cullen-earth, &c. as also out of calces of lead, as ceruse and minium; by sublimates of mercury and brimstone, as in vermilion; by tinging whole earths variously, as in verditer, and some of the lakes; by concrete juices, or feculæ, as in gambogium, indigo, pinks, sap-green, and lakes; as also by rusts, as in verdigrease, &c. 17. The applying these colours by the adhesion of ox-gall, as in the marble paper aforesaid; or by gum-water, as by limning; or by clammy drying oils, such as the oils of linseed, nuts, &c. 18. The watering of tabbies. 19. The colouring of wood, linen, cotton, silk, hair, feathers, horn, leather, and the threads and webs of them with woods, roots, herbs, seeds, leaves, salts, limes, lixiviums, waters, heats, fermentations, macerations, and other great variety of management: an account of all which is a short history of dyeing.

The Materials used in the Art of DYEING, are iron and steel, or what is produced from them, in all true blacks, called Spanish blacks, though not in Flanders blacks, viz. they use copperas, steel-filings, and flippe; they also use pewter for bow-dye scarlet, viz. they dissolve bars of pewter in aqua fortis; litharge is also used by some, though acknowledged by few to add weight to dyed silk. Antimony is much used to the same purpose. Arsenick is used in crimson, upon pretence of giving lustre, although those who pretend not to be wanting in giving lustre to their silks, disown its use. Verdigrease is also used by linen-dyers in their yellow and greenish colours; though, of itself, it strikes no deeper colour than that of a pale straw. Of mineral salts used in dyeing, the chief is alum; the true use whereof seems to be in regard to the fixation of colours. The next mineral salt is saltpetre, not used by ancient dyers, and but by few of the modern: nor is it yet used but to brighten colours, by back-boiling of them, for which argol is more commonly used: lime is much used in working blue-vats.

Of the animal family are used cochineal, urine of labouring men kept till it be stale and stinking, honey, yolks of eggs, and ox-gall; the use of the urine is to scour, and help the fermenting and heating of woad; and is used also in blue-vats instead of lime; it dischargeth the yellow, and therefore is used to spend weld withal.

Dyers use two sorts of water, viz. river and well-water; the last, which is harsh, they use in reds and other colours wanting restringency, and in dyeing materials of the flacker contextures, as in callicoe, fustian, and the several species of cotton-works; but it is not good for blues, and makes yellows and greens look rusty. River-water is more fat and oily, and is therefore used in most cases, and must be had in great quantities for washing and rinsing their cloths after dyeing. Water is called by dyers white liquor; but a mixture of one part bran, and five of river-water boiled an hour, and put into leaden cisterns to settle, is what they call liquor absolutely.

Gums have been used by dyers about silk, viz. gum arabick, tragacanth, mastick, dragon's blood. These tend little to the tincture, any more than gum in writing-ink, which only gives it a consistence: so gum may give the silk a glossiness; and lastly, to increase the weight.

The three peculiar ingredients for black are copperas, filings of steel, and flippe: the restringent binding materials are alder-bark, pomegranate-peels, walnut-rinds and roots, oaken-sapling bark, and saw-dust of the same, crab-tree-bark, galls, and fumack.

The salts are alum, salt-petre, sal ammoniac, pot-ashes and stone-lime; among which urine may be enumerated as a liquid salt.

The liquors are well and river-water, urine, aquavita, vinegar, lemon-juice, aquafortis, honey and molasses.

Ingredients of another class are bran, wheaten-flour, yolks of eggs, leaven, cummin-feed, fenugreek-feed, agarick and fenna.

The fineticks, or absterfives, are fuller's earth, soap, linseed-oil, and ox-gall.

The



The metals and minerals are pewter, verdigrease, antimony, litharge and arsenick.

The colourings are of three sorts, viz. blue, yellow and red; of which log-wood, old fustick, indigo and madder, are the chief.

*General Observations upon DYEING.*—1. All materials which of themselves do give colour, are either red, yellow, or blue; so that out of them, and the primitive fundamental colour white, all that great variety which we see in dyed stuffs doth arise.

2. That few of the colouring materials, as cochineal, foot, wood-wax, woad, &c. are in their outward and first appearance of the same colour, which by the slightest distempers and solutions in the weakest menstrua, they dye upon cloth, silk, &c.

3. That many of them will not yield their colours without much grinding, steeping, boiling and fermenting, or corrosion by powerful menstrua, as red-wood, weld, woad, arnotto, &c.

4. That many of them will of themselves give no colouring at all, as copperas, or galls, or with much disadvantage, unless the cloth or other stuff to be dyed be as it were first covered, or incrustated with some other matter, though colourless aforehand, as madder, weld, brazil, with alum.

5. That some of them, by the help of other colourless ingredients, do strike different colours from what they would of themselves, as cochineal, brazil, &c.

6. That some colours, as madder, indigo, and woad, by reiterated tinctures, will at last become black.

7. That although green be the most frequent and most common of natural colours, yet there is no simple ingredient now used alone to die green with upon any material; sap-green being the nearest, which is used by country people.

8. There is no black thing in use which dyes black, though both the coal and foot of most things burnt or scorched be of that colour; and the blacker, by how much the matter, before being burnt, was whiter, as in ivory-black.

9. The tincture of some dyeing stuffs will fade even with lying, or with the air, or will stain with water only, but very much with urine, vinegar, &c.

10. Some of the dyeing materials are used to bind and strengthen a colour; some to brighten it; some to give lustre to the stuff; some to discharge and take off the colour, either in whole or in part; and some out of fraud, to make the materials dyed, if costly, heavier.

11. That some dying ingredients, or drugs, by the coarseness of their bodies, make the thread of the dyed stuff seem coarser; some, by shrinking them, finer; and some, by smoothing them, finer.

12. Many of the same colours are dyed upon several stuffs with several materials, as red-wood is used in cloth, not in silks; arnotto in silks, not in cloth; and may be dyed at several prices.

13. That scouring and washing of stuffs to be dyed, is done with special materials, as sometimes with ox-galls, sometimes with fullers'-earth, and sometimes soap; this latter being, in some cases, pernicious, where pot-ashes will stain, or alter the colour.

14. Where great quantities of stuff are to be dyed together, or where they are to be done with any speed, and where the pieces are very long, broad, thick, or otherwise, they are to be differently handled, both in respect to the vessels and ingredients.

15. In some colours and stuffs the tingent liquor must be boiling, in other cases blood-warm, and in some it may be cold.

16. Some tingent liquors are fitted for use by long keeping, and in some the virtues wear away by the keeping.

17. Some colours or stuffs are best dyed by reiterated dippings in the same liquor, some by continuing longer, and others a less time therein.

18. In some cases, the matter of the vessel wherein the liquors are heated, and the tincture prepared, must be regarded, as the kettles must be pewter for bow-dye.

19. There is little reckoning made how much liquor is used in proportion to the dyeing drugs, it being ra-

ther adjusted to the bulk of the stuffs, as the vessels are to their breadth; the quantity of dyeing drugs being proportioned both to the colour, higher or lower, and to the stuffs; as likewise the salts are to the dyeing drugs.

Concerning the weight that colours give to silk, (in which it is most taken notice of, being sold by weight, and a commodity of great price) it is observed that one pound of raw silk loseth four ounces by washing out the gums, and the natural fordes. That the same scoured silk may be raised to above thirty ounces from the remaining twelve, if it be dyed black with some materials.

Of a thing very useful in dyeing, especially of black, nothing increases weight so much as galls, by which black silks are restored to as much weight as they lost by washing out their gum: nor is it counted extraordinary that blacks should gain about four or six ounces in the dyeing, upon each pound. Next to galls, old fustick encreases the weight about  $1\frac{1}{2}$  in 12; madder, about one ounce; weld, half an ounce. The blue vats in deep blues of the fifth stall, give no considerable weight; neither doth logwood, cochineal, nor even copperas, where galls are not: flippe adds much to the weight, and giveth a deeper black than copperas itself, which is a good excuse for the dyers that use it.

*DYEING of Wool and Woollen Manufactures.* For black in woollen manufactures, it is begun with a strong decoction of woad and indigo, that communicate a deep blue; after which the stuffs being boiled with alum and tartar, or pot-ash, are to be maddered with common madder, then dyed black with Aleppogalls, copperas, and sumack, and finished by black-boiling in weld. Wools for tapestry are only to be woaded, and then put in black. For scarlet, wool and woollen manufactures are dyed with kermes and cochineal, with which may also be used agarick and arsenick. Crimson-scarlet is dyed with cochineal, mastick, aquafortis, sal ammoniack, sublimate, and spirit of wine. Violet-scarlet, purple, amaranth, and pansy-scarlets, are given with woad, cochineal, indigo, braziletto, brazil, and orchal. Common reds are given with pure madder, without any other ingredient. Crimson-reds, carnations, flame and peach-colours, are given, according to their several hues, with cochineal, mastick, without madder, or the like. Crimson-red is prepared with Roman alum with cochineal. Orange-aurora, brick-colour, and onion-peel colour, are dyed with woad and madder, mixed according to their several shades. For blues, the dark are dyed with a strong tincture of woad; the brighter with the same liquor, as it weakens in working. Dark browns, minims, and tan-colours, are giving with woad, weaker in decoction than for black, with alum and pot-ashes, after which they are maddered higher than black: for tan-colours, a little cochineal is added. Pearl-colours are given with galls and copperas; some are begun with walnut-tree roots, and finished with the former; though to make them more useful, they generally dip them in a weak tincture of cochineal. Greens are begun with woad, and finished with weld. Pale yellows, lemon-colour, and sulphur-colour, are given with weld alone. Olive-colours of all degrees are first put in green, and taken down with foot, more or less, according to the shade that is acquired. Feulemort, hair-colour, musk, and cinnamon-colour, are dyed with weld and madder. Nacaret or bright orange, is given with weld and goat's-hair, boiled with pot-ashes.

*DYEING of Silks,* is begun by boiling them in soap, &c. then scouring and washing them in water, and steeping them in cold alum-water. For crimson, they are scoured a second time, before they are put into the cochineal-vat. Red-crimson is given with pure cochineal, mastick, adding galls, turmeric, arsenick, and tartar, all mixed in a copper of fair water, almost boiling; with these the silk is to be boiled an hour and a half, after which it is allowed to stand in the liquor till next day. Violet-crimson is given with pure cochineal, arsenick, tartar, and galls; but the galls in less proportion than in the former: when taken out, it is washed and put into a vat of indigo. Cinnamon-crimson



son is begun like the violet, but finished by back-boiling, if too bright, with copperas, and if dark, with a dip of indigo. Light blues are given in a bath of indigo. Sky blues are begun with orchal, and finished with indigo. For citron-colours, the silk is first alumed, then welded with indigo. Pale yellows, after aluming, are dyed in weld alone. Pale and brown aurora's, after aluming, are welded strongly, then taken down with rocou and dissolved with pot-ashes. Flame-colour is begun with rocou, then alumed; and afterwards dipped in a vat or two of brazil. Carnation and rose colours are first alumed, then dipt in brazil. Cinnamon-colour, after aluming, is dipt in brazil, and braziletto. Lead-colour is given with fustick, or with braziletto, galls and copperas. Black silks of the coarser sort are begun by scouring them with soap, as for other colours; after which they are washed out, wrung, and boiled an hour in old galls, where they are suffered to stand a day or two: then they are washed again with fair water, wrung, and put into another vat of new galls; afterwards washed again, and wrung, and finished in a vat of black. Fine black silks are only put once into galls of the new and fine sort, that has only boiled an hour: then the silks are washed, wrung out, and dipped thrice in black, and afterwards taken down by back-boiling with soap.

The dyeing of thread is begun by scouring it in a lye of good ashes: afterwards it is wrung, rinsed out in river-water, and wrung again. A bright blue is given with braziletto and indigo: bright green is first dyed blue, then back-boiled with braziletto and verdeter, and lastly woaded. A dark green is given like the former, only darkening more before woaded. Lemon and pale yellow is given with weld mixed with rocou. Orange isabella, with fustick, weld, and rocou. Red, both bright and dark, with flame-colour, &c. are given with brazil, either alone or with a mixture of rocou. Violet, dry rose, and amaranth, are given with brazil, taken down with indigo. Feulenort and olive-colour are given with galls and copperas, taken down with weld, rocou, or fustick. Black is given with galls and copperas, taken down and finished with braziletto wood.

DYKE, DIKE. See the article DIKE.

DYNASTY, among the old historians, signifies a race or succession of kings of the same line or family.

DYSCRACY, among physicians, implies an ill habit of the state of the fluids, or when the crasis is broken.

DYSENTERY, in medicine, implies a diarrhœa, or violent flux, wherein the excrements are mixed with blood or carneous filaments, and the bowels terribly tormented with griping pains.

The immediate cause of a dysentery, according to the most received opinion, is seated in the intestines, and consists in a highly acrid humour, generated by unripe summer fruits fermenting with other juices, especially those of the bilious kind, vellicating, corroding, and excoriating the nervous coats of the intestines.

When dysenteries begin with vomiting, succeeded by a hiccup, there is danger of an inflammation of the stomach. When clysters are immediately returned, or the anus so obstinately closed that nothing can be injected, it is a sign of a palsy in the rectum. And when swallowing is attended with a murmuring noise, it shews the approach of a delirium, an inflammation of the fauces, aphthæ, or a palsy of the whole œsophagus.

The common method of curing a dysentery, is first to bleed, then to vomit with ipecacuanha, afterwards to purge with rhubarb, and, last of all, to give astringents. When the bowels are ulcerated, it will be of service to inject clysters, either of fat broth with the addition of Venice-treacle, or the electuary of scordium, or Lucatelli's balsam. Sydenham, after bleeding, prescribes paregorick at night, and the next morning a cathartick.

Mr. Ray, from the information of Aubrey, says, that the fungous substance between the lobes of a walnut dried and powdered, and given in a moderate quantity of wine, cured the English army of a dysentery, when all other remedies failed. Jussieu says, a thick yellow bark, called Simaruba, has been found successful in the cure of a dysentery; and Kramer assures us, we may depend on the same effect from the decoction of common millet seed. Another specific is the Vitrum antimonii ceratum, which has been in use for some time. The ordinary dose for an adult is ten or twelve grains, and it has been found successful where bleeding and vomits have been premised, and where they have not. It is best, says Dr. Pringle, to withhold opium till the patient is both vomited and purged, and when it becomes necessary, to begin with small doses.

As to the diet, the same writer orders the patient to be confined to rice-gruel, panada, &c. and to barley-water, or the white decoction, for drink. In the convalescent state, he allows meat, but no small-beer, nor any milk, unless diluted with lime-water, it having been observed that milk has often renewed the griping pains.

DYSOREXY, among physicians, denotes a want of appetite, proceeding from a weak stomach. See the article APPETITE.

DYSPEPSY, in physick, a difficulty of digestion; or rather a depraved digestion, when the aliments in the stomach, for want of a due strength in the digestive organs, follow their spontaneous tendency, and contract an alkaline or acid putrefaction.

The word is formed from the Greek, *δυσ*, importing difficult, or bad, and *πεπλω*, to digest.

DYSPNOEA, in physick, a difficulty of breathing.

The word is derived from the Greek, *δυσ*, difficulty, and *πνεω*, to breathe.

A difficulty of breathing may be caused by any thing that can affect any part of the thorax, particularly the heart, large arteries, and lungs, by crude tubercles, vomicas, polypuses, and several other disorders.

DYSURIA, in medicine, a difficulty of making urine, attended with a sensation of heat and pain.

The word is derived from the Greek, *δυσ*, importing painful, and *ουρι*, urine.

This disease is distinguished from a stranguary, as, in the latter, the urine is voided by only a drop, as it were, at a time, but, however, with pain; and from an ischury, as in this disorder, there is an almost total suppression of urine.

DYTISCUS, water-beetle, in zoology, a genus of insects of the order of the coleoptera, the antennæ of which are slender and setaceous, and their feet formed for swimming.

Authors enumerate a great many species of this animal, among which is the great water-beetle, the largest of all European beetles, being an inch and an half in length, and all over of a deep and somewhat glossy black.



# E.

## E A G

**E**, The second vowel, and fifth letter of the alphabet. The letter E is most evidently derived from the old character  $\aleph$  in the ancient Hebrew and Phœnician alphabets, inverted by the Greeks to this position E, and not from the Hebrew He ה. From the same origin is also derived the Saxon *e*, which is the first letter in their alphabet that differs from the Latin one. It is formed by a narrower opening of the larynx than the letter A; but the other parts of the mouth are used nearly in the same manner as in that letter.

It has a long and short sound in most languages: the short sound is audible in *bed, fret, den*, and other words ending in consonants: its long sound is produced by a final *e*, or an *e* at the end of words, as in *glebe, here, scene, sphere, interfere, revere, sincere*, &c. in most of which it sounds like *ee*; as also in some others by coming after *i*, as in *believe, relieve*, &c. and sometimes this long sound is expressed by *ee*, as in *bleed, beer, creed*, &c. sometimes the final *e* is silent, and only serves to lengthen the sound of the preceding vowel, as in *rag, rage, stag, stage, hug, huge*, &c. The sound of *e* is obscure in the following words, *oxen, heaven, bounden, fire, massacre, maugre*, &c.

The Greeks have their long and short *e*, which they call Epsilon and Eta. The French have at least six kinds of *e*'s: The Latins have also a long and short *e*; they also write *e* instead of *a*, as *dicem* for *dicam*, &c. and this is, no doubt, the reason why *a* is so often changed into *e*, in the præter tense, as *ago, egi; facio, feci*, &c. E was also a numeral letter standing for 250, according to the verse.

*E quoque ducentos et quinquaginta tenebit.*

**EAGLE**, in natural history, the swiftest, largest, and strongest of all the birds of prey.

The fight of this bird is remarkably strong and piercing, so that it is able to face the sun, and endure its brightest rays.

The jesuit Angelus, in his opticks, assures us, that it has two sets of eye-lids, the one thick and close, and the other thinner and finer; which last it draws over the eye, when it looks directly at any luminous body; by which means the force of its rays is broken.

**EAGLE**, in heraldry, is accounted one of the most noble bearings in armoury, and according to the learned in this science, ought to be given to none but such as greatly excel in the virtues of generosity and courage, or for having done singular services to their sovereigns: in which cases they may be allowed a whole eagle, or an eagle naissant, or only the head or other parts thereof, as may be most agreeable to their exploits.

Among the ancients, the eagle was held sacred to Jupiter, and on that account placed on his sceptre. Philostratus, in his Themistocles, says, the Medes and Lacedæmonians took it for their ensign of royalty: and it is well known that the Romans had the greatest respect for it, looking upon it as the talisman of their state, and taking it for their principal ensign. It was either of gold or silver, borne single on the point of a pike, till the time of Constantine, when the empire being divided into the eastern and western, the eagle was afterwards represented with two heads.

**EAGLE**, in astronomy. See **AQUILA**.

**White EAGLE**, an order of knighthood, instituted in Poland by Uladislaus V. on marrying his son Casimir, to a daughter of the grand duke of Lithuania, in the year 1325.

**Black EAGLE**, a military order instituted by the

## E A R

elector of Brandenburg, on his being crowned king of Prussia in 1701.

**EAGLE**, in architecture, is a figure of that bird, anciently used as an attribute or cognizance of Jupiter in the capitals and frizes of the columns of temples consecrated to that god. *Build. Diet.*

**EAGLE-stone**, in natural history. See **ÆTITES**.

**EAGLET**, a diminutive of eagle, and properly signifies a young eagle.

**EAR**, in anatomy, the organ of hearing.

Anatomists divide the ear into three parts; the exterior, the middle, and the interior. The exterior part is called simply the auricle, but more properly auris externa. In this there are a great many eminences, and cavities; as, the pinna and lobule; the helix and anthelix; and the tragus and antitragus, the scapha, which is a cavity between the helix and the anthelix behind; and the concha, which is a larger cavity, situated before the meatus auditorius, or passage into the internal ear: here are to be observed the glandulæ sebaceæ of Valsalva, which are mere cutaneous follicles: their substance is composed of the common integuments and a cartilage.

The muscles of the external ear are in human subjects very small, often scarce discernible: however, sometimes two, three, or more of them, may be distinguished. These, from their situation, may be called the superior, the posterior, and the anterior. Their use in moving the ear is none at all, or very inconsiderable; their real use, as is supposed, is to render the ear tense, when we would hear more distinctly. The course of the meatus auditorius is tortuous and oblique, turning chiefly towards the anterior parts. Its substance is partly boney, and partly cartilaginous: it is covered with an elastick membrane: the membrane investing its internal part is continuous with the cutis. In the convex part of this membrane, about the middle of the passage, are situated certain small glands, of a yellow colour, called glandulæ ceruminosæ; they serve to secrete the cerumen, which they deposit for various purposes in the passage.

The use of the external ear is to receive and convey sounds in the manner of an acoustick tube, in order to our hearing them more distinctly.

The middle part of the ear is called the tympanum: in this we are to observe the membrana tympani, which is situated at the extremity of the auditory passage. Its situation is very oblique inwards; its figure elliptick, and its surface concave. It is connected in its circumference with a ring of a boney substance in infants, which becomes afterwards transformed into the auditory passage, and in the middle it is connected with the little bone, called the malleus. Its substance is membranaceous, composed of two or three lamellæ, and is furnished with a vast number of blood vessels.

Some authors mention a natural foramen, very small, and placed in an oblique direction, penetrating this membrane, and letting the smoke of tobacco, taken in at the mouth, find a passage through it out at the ears. The boney cavity of the tympanum is much smaller in human subjects than in quadrupeds. In this cavity are to be observed the periosseum, which is very thin, and furnished with a great number of blood-vessels; the chorda tympani, being a little nerve composed by a combination of ramuli, or little branches of the fifth and seventh pair: this is extended in the manner of a cord, under the membrane of the tympanum. Here may be observed the three ossicula auditus, covered with the periosseum; these are called the malleus, the incus, and



and the stapes. The manubrium, or handle of the malleus, adheres to the membrane of the tympanum, and its head is articulated by a ginglymus with the body of the incus; and finally, the longer leg of this is articulated by arthrodia, with the head of the stapes: the stapes also, at its base, adheres to the fenestra ovalis, by means of a membrane.

The muscles of the malleus are two, an external and internal: the stapes has but one. The two fenestræ, or openings, are distinguished by the oval and the round; the fenestra ovalis leads to the vestibule, on which stands the stapes; the fenestra rotunda leads to the cochlea, and is closed by a membrane.

Besides the fenestræ, there are two other foramina, the one of these opens into the tube or duct of Eustachius, and terminates in the mouth, almost immediately behind the tonsils: this duct is partly boney, partly cartilaginous, and partly membranous, affording a communication between the mouth and the ears: the other of these foramina goes to the cellulæ of the mastoide processes.

The third division, or the inner part of the ear, is generally termed the labyrinth: here are to be observed the vestibulum, being a cavity that forms the middle part of the labyrinth: the passage into this is the fenestra ovalis; after which may be observed the free semicircular canals, distinguished by the names of the largest, the middle one, and the least, which open by five orifices into the vestibulum. The cochlea of the ear is opposite to these canals, and is placed in the manner of a snail-shell, forming two turns and a half, in a spiral form. In this are to be remarked the nucleus and the canal, which is divided into two, by a spiral lamina: the upper of these opens into the vestibulum, and is called the scala vestibuli, and the lower, which terminates in the hollow of the tympanum, through the fenestra rotunda, is called scala tympani.

A very delicate and fine membrane, carried along through the cavities of the labyrinth, is formed of an expansion of the auditory nerve, and is the primary part of the organ of hearing, just as the retina is formed of the expansion of the optick nerve, and is the primary organ of seeing. Next may be observed the auditory canal, which is distinguished into the common and proper; the common is large, and has foraminula in it, passing into the labyrinth; the proper one is narrow and longer, terminating partly in the cavity of the cranium, and partly between the styloide and mastoide processes.

The nerves of the inner ear are, 1. From the auditory pair. 2. From the third pair of the vertebrae of the neck, but these are principally sent to the external ear. The arteries are from the carotids, both external and internal: the veins run partly to the jugulars, and partly to the sinuses of the dura mater.

EAR-ACH, a grievous pain in the auditory passage, proceeding from a sharp extravasated serum, affecting the nervous membrane which covers the meatus auditorius.

When this matter is translated to the external part, then the ear-ach arises, which, unless speedily appeased, may cost the patient his life.

The principal scope is to ease the pain, which may be done with nitrous and cinnabarine powders, and with emulsions of the greater cold seeds: but if these are ineffectual, recourse must be had to opiates, such as styrax pills, or the bare tincture. Outwardly lay a plaster to the temple of the affected side, composed of mastick, galbanum, saffron, expressed oil of nutmegs, and opium. Let the ear afterwards be held over the vapour of milk, with the fragrant and emollient spices. The smoke of tobacco blown into the ear is of great efficacy.

EARING, among mariners, signifies that part of the bolt-rope of a sail that is left open, in the form of a ring.

EARL, a British title of nobility, next below a marquis, and above a viscount.

EARL *marshal of England*, is a great officer who had anciently several courts under his jurisdiction, as the court of chivalry, and the court of honour. Under him is also the herald's office or college of arms. He hath some pre-eminence in the court of Marshalsea, where he may sit in judgment against those who offend within

the verge of the king's court. This office is of great antiquity in England, and anciently of greater power than now; and has been for several ages hereditary in the most noble family of Howard.

EARNEST, money advanced to bind the contracting parties to the performance of a verbal bargain.

EARTH, in physiology, a fossil or terrestrial matter, of which our globe partly consists.

EARTH, in astronomy and geography, is one of the primary planets, being this terraqueous globe on which we live.

*Figure of the EARTH*, the form of this terraqueous planet, which some of the ancients supposed to be that of an oblong cylinder, some that of a drum, and others that of a flat circle. But the moderns, by the following observations, have demonstrated it to be nearly that of a sphere.

1. When we are at sea on board a ship, we may be out of sight of land, when the land is near enough to be visible, if it were not hid from our eye by the convexity of the water. Thus let ABCD (*Plate XXXII. fig. 7.*) represent part of the globe of the earth; let M be the top of a mountain; this cannot be seen by a person on board a ship at B, because a line drawn from M to his eye at E, is intercepted by the convexity of the water: but let the ship come to C, and then the mountain will be visible, because a line may be drawn from M to his eye at F. 2. The higher the eye is, the further will the view be extended: it is very common for sailors from the top of the mast of a ship, to discover land or ships at a greater distance than they can do when they stand upon deck: thus (*fig. 8.*) the top of the tower D may be seen from B, the top of the mast, when it cannot be seen from A, by reason of its being hid by the convexity of the water. 3. When we stand upon the shore, the highest part of a ship is visible at the greatest distance: if a ship is going from us out to sea, we shall continue to see the mast, after the hull or body of the ship disappears, and the top of the mast will continue to be seen longest; if a ship be coming towards us, the top of the mast comes first into view, and we see more and more of it, till at last the hull appears: thus let the eye be at C, when a ship is as far off as at F, only the top of the mast is visible, the hull is hid behind the water; when the ship is nearer, as at E, the hull may also then be seen. If the surface of the sea were a flat, (*fig. 11.*) a line might be drawn from any object situated upon it, as the ship D, to the eye, whether placed high or low, at A or B: in this case, any object upon the earth or sea would be visible at any distance which was not so great as to make the appearance of it too faint, or the angle under which it appears too small to be seen by us: an object would be visible at the same distance, whether the eye were high or low: not the highest but the largest objects would be visible, to the greatest distance, so that we should be able to see the hull of a ship further off than the mast: all which is contrary to experience. 4. The convexity of the water may be seen upon any still water, as upon a river which is extended in a straight line, a mile or two in length; a little boat upon the water may be seen, at a mile distance, by a man whose eye is any height above the water: but if he stoops down and lays his eye near the water, he will find the surface thereof rising up in such a manner as to cover the boat, and intercept his view of it. 5. Several navigators have sailed quite round the globe; not in an exact circle, for this the winding of the shores, the land running out in many places into the sea, would not admit of; but going in and out, as the shores happen to lie, they have held on the same course, and come home on a different side from that they first set out from. Thus, Ferdinand Magellan setting out on the west side of Spain, continued sailing westward till he returned home on the east side of Spain; our Sir Francis Drake, Capt. Dampier, Lord Anson and others have done the like; the course they have some of them run is marked upon some maps and globes: these proofs are sufficient to evince the roundness of the water; that the earth is also round is evident, if we consider that the ocean is diffused all over the globe, so as to divide the earth as it were into large islands; and that the surface of the earth is not very much higher than the sea,



is evident from the course of rivers, which at a moderate estimate are computed to have not above one mile fall in running a thousand miles, and have their shores pretty much of the same height; as also from the height of mountains, which are none of them found to be above three or four miles higher than the surface of the sea; these experiments prove the earth and sea to have a convex surface every where. 6. All the appearances of the heaven, both at land and sea, are the same as they would be if the earth were a globe, which proves it to be of that shape; and lastly, in eclipses of the moon, which are caused by the shadow of the earth falling upon the moon. This shadow is always circular, whatever situation the earth is in at that time: now a body can be no other than a globe, which in all situations casts a circular shadow: it is true the surface of the earth is not an exact geometrical globe, because it sinks into vallies in some places, and rises into mountains in others: but these inequalities upon its surface are as inconsiderable, when compared with the magnitude of the earth, as the little asperities upon the rind of an orange are to the bulk of the orange; and accordingly we find that mountains and vallies upon the surface of the earth cause no irregularities in its shadow, in a lunar eclipse, but the circumference thereof is even and regular, as if it were cast by a body exactly globular. The diameter of the earth is about eight thousand English miles; the highest mountain is not four miles higher than the surface of the sea, which is about a two thousandth part of the earth's diameter: thus it appears that the highest mountain bears no greater proportion to the bulk of the earth than a grain of dust does to a common globe.

These observations were sufficient to demonstrate that the earth was of a spherical form; and as a sphere is the most capacious solid, the earth was considered as a true sphere, till the following incident gave occasion to Sir Isaac Newton and Mr. Huygens to investigate its true figure from the principles of hydrostatics, and the revolution of the earth about its axis; and they demonstrated that it was not a true sphere, but an oblate spheroid, flattened towards the poles. The incident that gave rise to these subtle demonstrations was this:

M. Richer, when at the island of Cayenne, about  $5^{\circ}$  distant from the equator, found that his clock which at Paris kept true time, now lost  $2''$  and  $28'''$  every day. Now, though heat will lengthen pendulums, and consequently retard their motion, it is certain the heats of Cayenne were not sufficient to solve this phenomenon, which can flow only from a diminution in the pressure of gravity. For, as the earth revolves about its axis, all its parts will endeavour to recede from the axis of motion, and thereby the equatorial parts where the motion is quickest, will tend less towards the centre than the rest; their endeavour to fly off from the axis about which they revolve, taking off part of their tendency that way; so that those parts will become lighter than such as are nearer the poles. The polar parts, therefore, will press in towards the centre, and raise the equatorial parts, till the quantity of matter in the latter is so far increased as to compensate for its lightness, and an equilibrium be restored. On which account, the form which the earth assumes will be that of an oblate spheroid, whose shorter axis passes through the poles. By virtue only of the rotation of the earth about its axis, the weight of bodies at the equator is less than at the poles, in the proportion of 288 to 289. From hence arises, as before observed, a spheroidical form of the earth, and from that spheroidical form arises another diminution of gravity at the equator, by which, if the earth were homogenous throughout, bodies at the equator would lose one pound in 1121, and so on both accounts taken together, the gravity of bodies at the poles would be to the same at the equator as 230 to 229. From whence, if we suppose the gravity of bodies within the earth to be directly as their distance from the centre, those numbers will also express the relation between its polar and equatorial diameter. This is upon a supposition that the earth was at first fluid, or a chaos, having its solid and fluid parts confusedly mixed together; but if we suppose it at first partly fluid and partly dry, as it now is, since we find that the land is very

nearly of the same figure with the sea, except raised a little to prevent its being overflowed, the earth must still be of the same form; for otherwise the major part of the water would flow towards the equator, and spread itself like an inundation over all the land in those parts. This theory met with great opposition from Monsieur Cassini, who having measured the meridian of France, declared (with great reason likewise if the observations had been correct) that the earth, instead of being flattened, was lengthened towards the poles, that is, instead of being an oblate, it was an oblong spheroid, higher at the poles by about ninety-five miles. So wide a difference, between philosophers of so high rank, determined at length the king of France, at an expence becoming a monarch, to employ two companies of mathematicians, the one to measure the length of a degree of the meridian at the equator, and the other the length of a degree at the polar circle, that by comparing them together, and with the length of a degree of France, it might be known whether the earth were oblong or flat towards the poles.

It is certain, if the lengths of the degrees of latitude decrease, as we go from the equator towards the poles, then the axis is greater, and the figure an oblong spheroid; but on the contrary, if these lengths increase, as you remove towards the poles, the axis is less than a diameter at the equator, and consequently the figure an oblate spheroid.

This last appears, by the respective mensurations of these mathematicians (as it did before by the theory of Sir Isaac Newton) to be the true figure; the result of their operations, which were performed with a surprising degree of exactness, being as follows. The measure of a degree of the meridian in the latitude of  $66^{\circ} 20'$ , was found to be 57437  $\frac{2}{3}$  toises, and in the latitude of  $49^{\circ} 21'$  only 57183 toises; for the observations of Mr. Cassini have been corrected by some gentlemen of the French academy, since the return of the academicians from the north. Now supposing those degrees accurately measured, the axis or diameter that passes through the poles will be to the diameter of the equator, as 177 to 178, and hence the earth will be twenty-two miles higher at the equator than at the poles. The length of a degree of the meridian under the equator was found to be 56767 toises, and by reducing it to the level of the sea, 56746 toises: but as the heat must needs have produced some variation in the length of the toise that was used when this correction is made, the length of a degree was found to be 56753 toises, and the ratio of the axis of the earth to the diameter of the equator, that of 178 to 179; whence it follows that the earth is oblate, or flattened a 179th part towards the poles. Hence the length of the degrees of the meridian in any latitude are determined. If any one is desirous of being informed of the methods observed in performing these mensurations at the equator, and the arctic circle, let him consult Mr. Maupertuis's figure of the earth determined, with Mr. Murdoch's translation, and the book lately published by Mr. Bouguer and Condamine.

*Geographical Divisions of the EARTH*, comprehend, 1. Its natural divisions, as continent, island, peninsula, ocean, lake, gulph, &c. 2. Its political divisions, as empire, kingdom, province, city, Germany, Britain, Middlesex, London, &c. 3. The ecclesiastical divisions, as archbishoprick, diocese, parish, &c.

*Motion of the EARTH*. The earth has a triple motion. 1. A diurnal motion round its own axis, from W. to E. in 24 hours, which occasions the perpetual succession of days and nights.

2. An annual Motion round the sun in a year, which produces the different seasons, and the lengthening and shortening of the days. See the article SEASONS.

3. The motion by which the poles of the world revolve round those of the ecliptick. See *Precession of the EQUINOXES*.

*EARTH*, in chymistry, the fourth of the chymical elements, into which bodies are resolvable by fire. See the article ANALYSIS.

*EARTH*, in husbandry, the soil, or mould, in which vegetables are sown.

*EARTHQUAKE*, in natural history, a violent agitation



tation or trembling of some considerable part of the earth generally attended with a terrible noise like thunder, and sometimes with an eruption of fire, water, wind, &c.

*Causes of EARTHQUAKES.* Earthquakes and volcanos are both produced from the same cause, which may be thus explained. The countries which yield great store of sulphur and nitre, or where sulphur is sublimed from the pyrites, are by far the most injured and incommoded by earthquakes; for where there are such mines, they must send up exhalations, which meeting with subterraneous caverns, must stick to the arches of them, as soot does to the sides of our chimnies; where they mix themselves with the nitre or saltpetre which comes out of the inside of these arches, in like manner as we see it come out of the inside of the arch of a bridge, and so makes a kind of crust which will very easily take fire.

There are several ways by which this crust may take fire, viz. 1. By the inflammable breath of the pyrites; which is a kind of sulphur that naturally takes fire of itself. 2. By a fermentation of vapours to a degree of heat, equal to that of fire and flame. 3. By the falling of some great stone which is undermined by water, and striking against another, produces some sparks that set fire to the neighbouring combustible matter, which being a kind of natural gunpowder, at the appulse of the fire goes off with a sudden blast or violent explosion, rumbling in the bowels of the earth, and lifting up the ground above it, so as sometimes to make miserable havock and devastation, till it gets vent or a discharge. Burning mountains and volcanos, are only so many spiracles serving for the discharge of this subterranean fire, when it is thus preternaturally assembled. And where there happens to be such a structure and confirmation of the interior parts of the earth, that the fire may pass freely and without impediment from the caverns therein, it assembles into these spirals, and then readily and easily gets out from time to time without shaking or disturbing the earth. See the article VULCANO.

But where a communication is wanting, or the passages are not sufficiently large and open, so that it cannot come out at the said spiracles without first forcing and removing all obstacles, it heaves up and shocks the earth, till it hath made its way to the mouth of the vulcano; where it rusheth forth, sometimes in mighty flames, with great velocity, and a terrible bellowing noise.

Earthquakes are sometimes confined to a narrow space, which is properly the effect of the re-action of the fire; and they shake the earth just as the explosion of a powder-magazine causes a sensible concussion at the distance of several leagues. Thus a violent eruption of Etna, will cause an earthquake over all the island of Sicily; but it will never extend to the distance of 300 or 400 leagues. In like manner, when some new vents of fire have been formed in mount Vesuvius, there are felt at the same time earthquakes at Naples, and in the neighbourhood of the vulcano; but these concussions have never shaken the Alps, nor been communicated to France, or other countries remote from Vesuvius.

Sometimes they are felt at considerable distances, and shake a long tract of ground without any eruption or vulcano appearing. We have instances of earthquakes which were felt at the same time in England, France, Germany, and even in Hungary, and these extend always a great deal more in length than in breadth; they shake a tract of ground with more or less violence in different places, in proportion as it is remote from the fire; and they are almost always accompanied with a dull noise like that of a heavy carriage rolling along with great rapidity.

*EASEL-PIECES*, a name given by painters to such pieces as are contained in frames, in contradistinction to those painted on ceilings, &c.

*EASEMENT*, in law, implies some convenience, which one neighbour has of another by charter or prescription, as a way through his grounds, &c.

*EAST*, one of the four cardinal points of the horizon, being that in which the sun appears to rise when he is in the equinoctial.

*EASTER*, a festival of the Christian church, observed in memory of our Saviour's resurrection.

The Greeks call it *πασχα*, the Latins, *pascha*, and

Hebrew word signifying passage, applied to the Jewish feast of the passover, to which the Christian festival of Easter corresponds. It is called Easter in the English, from the goddess Eostre, worshipped by the Saxons with peculiar ceremonies in the month of April.

It was in conformity to the custom of the Jews, who were commanded by God himself to celebrate the passover in the first month, and on the 14th day of that month in the even, that the primitive fathers ordered that the 14th day of the moon from the calendar new moon, which immediately follows after the 21st of March, at which time the vernal equinox happened upon that day, should be deemed the Paschal full-moon, and that the Sunday after, because our Saviour rose on the day after the Jewish passover, should be Easter-day: and it is upon this account that our rubrick has appointed it upon the first Sunday after the first full-moon immediately following the 21st day of March, upon which day, at that time, the vernal equinox happened: whence it appears that the true time of celebrating Easter, according to the original institution of the feast of the passover, as well as according to the intent of the council of Nice, was to be the Sunday after the first full-moon immediately following the vernal equinox, or when the sun entered into the first point of Aries: and this was the principal view pope Gregory had, when he reformed the calendar, to celebrate Easter according to the intent of the Nicene council: and as the new-style has been ordered by act of parliament to be used in Great-Britain for the future, it will be necessary to shew the method of finding Easter, according to this method of computation, which may be performed by the following rule.

Find the epact for the year proposed, and, if it be less than 24, subtract it from 74; but if it be 24, it must be taken from 73; also, if the epact be 25, and the golden number between 12 and 19, both numbers inclusive, the epact must be taken from 73; and the remainder will be Easter limit, or the day of the Paschal full-moon. If the limit do not exceed 31, the day of the full-moon will be in March; but if it exceeds 31, it will be in April, the Sunday after which full-moon will be Easter-day.

But to save the trouble of calculation, we shall insert the following table, by which Easter-day may be found by inspection from the present time, till the year 1899 inclusive, according to the Gregorian method.

A TABLE to find EASTER till the year 1899 inclusive.

SUNDAY LETTERS.							
G.Numb.	A.	B.	C.	D.	E.	F.	G.
I.	April 16	17	18	19	20	14	15
II.	April 9	3	4	5	6	7	8
III.	March 26	27	28	29	23	24	25
IV.	April 16	17	11	12	13	14	15
V.	April 2	3	4	5	6	Mar. 31	April 1
VI.	April 23	24	25	19	20	21	22
VII.	April 9	10	11	12	13	14	8
VIII.	April 2	3	Mar. 28	29	30	31	April 1
IX.	April 16	17	18	19	20	21	22
X.	April 9	10	11	5	6	7	8
XI.	March 26	27	28	29	30	31	25
XII.	April 16	17	18	19	13	14	15
XIII.	April 2	3	4	5	6	7	8
XIV.	March 26	27	28	22	23	24	25
XV.	April 16	10	11	12	13	14	15
XVI.	April 2	3	4	5	Mar. 30	31	April 1
XVII.	April 23	24	18	19	20	21	22
XVIII.	April 9	10	11	12	13	7	8
XIX.	April 2	Mar. 27	28	20	30	31	April 1

To make use of the preceding table, find the Sunday letter for the year in the uppermost line, and the golden number, or prime, in the first column; and in the common angle of meeting, you have the day of the month on which Easter falleth that year. But note, that the name of the month is set on the left hand, or just with the figure, and followeth not, as in other tables, by descent, but collateral.

*EASTERN*, an appellation given to whatever relates to the east: thus we say, eastern amplitude, eastern church, &c.

*EAVES*, in architecture, the margin or edge of the roof of an house; being the lowest tiles, slates, or the like,



like, that hang over the walls, to throw off water to a distance from the wall.

**EAVES LATH**, a thick feather-edged board, generally nailed round the eaves of a house for the lowermost tiles, slates, or shingles, to rest on.

**EBDOMARIUS**, in the primitive church, an officer appointed to superintend the performance of divine service in cathedral churches.

**EBIONITES**, in ecclesiastical history, the followers of Ebion, a converted Jew, who flourished in the first century.

They denied the divinity of Christ, united the ceremonies of the Mosaiick institution, and rejected all the New Testament, except the gospel of St. Matthew.

**EBONY**, an extremely solid wood capable of a very fine polish. The tree which produces it grows naturally in several of the islands of the Archipelago, as well as in the E. and W. Indies.

**EBULLITION**, the same with boiling. See the article **BOILING**.

**EBULLITION**, is also used to signify the same with effervescence. See the article **EFFERVESCENCE**.

**ECCHYMOSIS**, in surgery, an extravasation of the blood from a vein, between the flesh and the skin.

**ECCLESIASTES**, a canonical book of the Old Testament composed by Solomon, to shew the vanity of all sublunary things.

**ECCLESIASTICAL**, an epithet applied to every thing belonging to the ecclesia, or church.

**ECCLESIASTICUS**, an apocryphal book, wrote by Jesus, the son of Sirach, and read in church for pious instruction.

**ECHINATE Seeds**, among botanists, are those which are rough and prickly, like an Echinus, or hedge-hog.

**ECHO**, a sound reflected to the ear from some solid body.

In order to account for the nature of echoes, we must consider, that sound is perceived as coming from that place, from which as a centre. the pulses are propagated. This is well known by experience. But, to illustrate this matter, let A (*Plate XXXII. fig. 9.*) be the centre from whence any sound is directly propagated, and strikes against any plain obstacle CB, sufficiently large; draw AF perpendicular to BC, and produce it to H, so that it may be  $AF = FH$ ; the sound reflected will be perceived as coming from the point H.

For let AE be the incident ray impinging against the obstacle BC, in the point E; from E draw the ray ED, in such a manner that the angle CED may be equal to the angle FEA, or that the angle of incidence may be equal to the angle of reflection; then will ED be the reflected ray of sound; and, if produced, will pass through the point H; for the angle FEH = CED = FEA. Therefore in the triangles AFE and EFH, since the angles of one are respectively equal to the angles of the other, and the side FE is common to both, the sides of one triangle will be respectively equal to the sides of the other; and therefore  $HF = AF$ ; wherefore the reflex sound will be heard by a person at D, as coming from the point H.

As the place of the auditor, or point D, approaches towards A, the case will constantly be the same with respect to the centre of sound H; the triangles will still be equal, and all their angles and sides respectively: therefore, when D coincides with A, the reflex sound, or echo, will be heard from the point H. Q. E. D.

The same sound therefore is heard twice by an auditor at D; first by the direct ray AD, and secondly by the reflex ray AED; provided the difference between AD and AED be sufficiently great, that the direct and reflex sound do not in the same sensible moment of time affect the ear: for if the reflex sound arrive at the ear before the impression of the direct sound ceases, the sound will not be double, only rendered more intense.

We know by experience, if more than nine or ten syllables be produced in a second, the sounds will not be distinct and articulate; therefore, that the reflex sound may not be confounded with the direct sound; there ought to be at least the ninth part of a second between the times of their appulse to the ear. But in

the ninth part of a second, the sound runs through the space of  $\frac{1142}{9} = 127$  feet; the difference therefore between AD and AED must not be less than 127 feet, for the echo to be distinctly heard in D.

Hence also it follows, that a person speaking or uttering a sentence in A aloud, in order to observe the echo by reflection from the obstacle BC, ought to stand at least 73 or 74 feet from it, that is,  $AF = 74$ ; and since, at the common rate of speaking, we pronounce not above 3 and  $\frac{1}{2}$  syllables per second, or read more than 20 lines of English poetry per minute; therefore, that the echo may return just as soon as the three syllables are expressed, we must have twice AF equal to about 1000 feet; or the speaker must stand about 500 feet from the obstacle BC; and so in proportion for any number of syllables.

In all the experiments which Dr. Derham made with the guns at Blackheath, there was always a reduplication of the sound, particularly on February 13, 1704, where the direct sound came first in 120 half seconds, and the reflex sound or echo in 122 half seconds: the difference in time, being a whole second, shews the echo passed over 1142 feet more than the direct sound; and that therefore the phonocamptick object, or obstacle which reflected the sound, was very probably near the guns; since, after the pulses had passed a good way, they would have been too weak, when reflected, to have made an echo as strong or stronger than the direct sound, as the doctor always found it was.

By some experiments which he made on guns fired on the river Thames, between Deptford and Cuckold's Point, he observed the sound was not only doubled, but tripled, quadrupled, and sometimes repeated many more times, and each succeeding echo was louder and louder; and often, when he heard those echoes of great guns, he observed a murmur aloft in the air, especially if the heavens were quiet and serene: and those pulses of air he has observed to strike against a thin cloud, and produce it in a murmur for the space of 15". From hence he judged, that those murmurs in the air proceed from the vaporous particles suspended in the atmosphere which resist the undulations of sound, and reverberate them to the ear of the observer, in the manner of indefinite echoes.

**ECHO**, in architecture, is applied to certain vaults and arches, generally of elliptical or parabolical figures erected to produce artificial echoes.

**ECHO**, in poetry, is a kind of composition, wherein the last words or syllables of each verse contain some meaning, which, being repeated apart, answer to some question or other matter contained in the verse. Virgil has a beautiful one:

*Crudelis mater magis, an puer improbus ille?  
Improbus ille puer, crudelis tu quoque mater.*

And Ovid also,

*Si nisi quæ facie poterit te digna videri,  
Nulla futura tua est; nulla futura tua est.*

**ECHOMETER**, in musick, a kind of scale, having several lines divided on it, to find the intervals and ratios of sounds.

**ECLECTICKS**, ancient philosophers, who, without attaching themselves to any particular sect, selected from all whatever appeared to them the most rational.

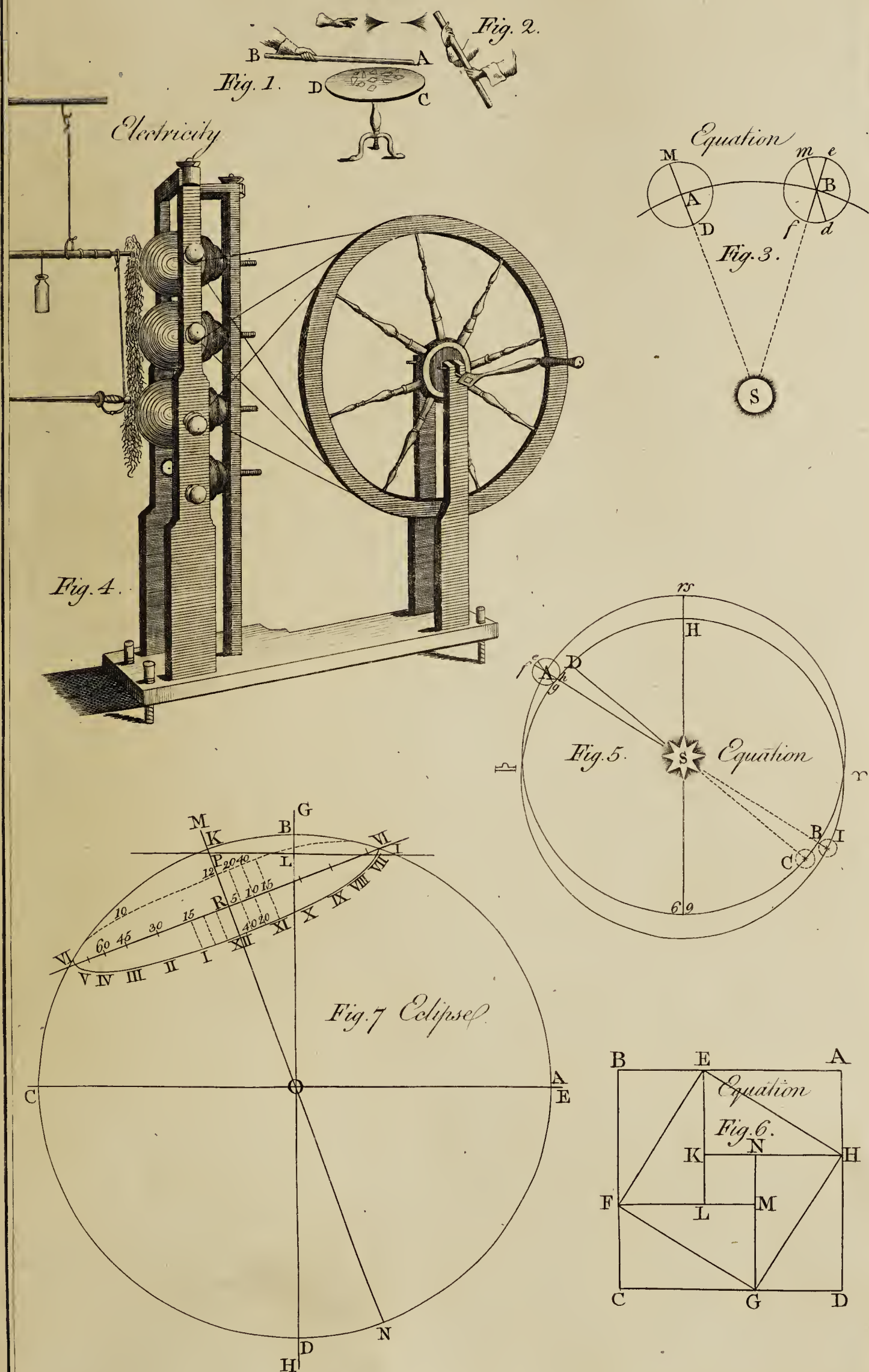
**ECLIPSE**, in astronomy, a privation or deficiency of light in some of the heavenly bodies, occasioned by the interposition of some opaque body between it and the eye of the spectator, or between it and the sun.

Eclipses are either solar or lunar. In the former, or an eclipse of the sun, the light is intercepted from the sight of the inhabitants of some part of the earth, by the moon's passing between them and the sun; and as its disk is either partly or wholly covered, it is called a partial or total eclipse.

An eclipse of the moon is caused by her passing through the shadow of the earth, whereby she is deprived of the sun's light.

The sun can never be eclipsed but at the time of the new moon; nor can there be any eclipse of the moon











but at the time of her full. In the first case, the moon must be within  $18^{\circ}$  of one of her nodes, and within 12 in the latter.

These eclipses do not happen every new and full moon, because the moon's motion is not in the plane of the ecliptick, in which the sun and earth are always found. Hence the moon's latitude is many times so greatly increased at the time of the new moon, that her shadow does not touch the earth; and the time of her full, she as frequently passes by the earth's shadow without entering into it: but when the moon's latitude is inconsiderable, which only happens when she is within the limits above-mentioned, she then appears either in or near the ecliptick, and eclipses of either luminary may happen.

Let HG (*plate XXXII. fig. 10.*) represent the path of the moon, EF the plane of the ecliptick, in which the centre of the earth's shadow always moves; N the node of the moon's orbit; A, B, C, D, four places of the earth's shadow in the ecliptick; when her shadow is at A, and the shadow and the moon passing by at I, she will not enter into the shadow; but when the full moon is nearer to the node at K, only part of her body passes through the shadow B, and that part becomes dark; this is called a partial eclipse. When the full moon is at M, she enters into the shadow C; in passing through it, she becomes wholly darkened at L, and leaves the shadow at O; this is called a total eclipse. And when the moon's centre passes through that of the shadow, which can only happen at the very time she is in the node at N, it is called a central eclipse.

We have not yet mentioned the atmosphere, which requires our consideration while we are treating of lunar eclipses.

Let I (*plate XXXII. fig. 4.*) represent the earth, BCDB *fig* its atmosphere, AB, AB, rays proceeding from the sun at S, touching the atmosphere at B and B; these go straight on and terminate the shadow of the atmosphere at H. The moon is constantly enlightened by the sun's rays until she enters this shadow, when she becomes fainter as she continues to move between ABH and ABH.

The rays which enter the atmosphere obliquely are refracted, and bent with curves that touch the earth; all the light between Ff and Gg is intercepted by the earth; and the rays CE, DE, terminate the earth's shadow.

The light between Ff and AB, is refracted by the atmosphere, and diffused between CE and AB and continued beyond E, the point of the earth's shadow: whence it is plain, that the light proceeding from the sun becomes continually weaker, the further it is from the earth; so that the shadow of the atmosphere is but a weak light, and therefore the moon is visible in an eclipse.

The shadow of the atmosphere is conical, because the diameter of the sun is greater than that of the earth. This cone does not reach so far as the planet Mars: but the diameter of the shadow, in the place where it cuts the moon's orbit, is not one fourth less than the earth's diameter.

A solar eclipse happens, when the new moon is in or near the node. In *fig. 2.* S. represents the sun, M the moon, her shadow falling upon DC, a part of the earth's circumference, which is surrounded by a penumbra. Beyond A and F, the earth is illuminated by an entire hemisphere of the sun. As you move from A to C, or from F to D, the light is continually diminishing; and near C and D, the rays come to the earth only from a small point of the sun's surface.

This diminished light, which surrounds the shadow every way, is called the penumbra. An observer at B or E can only see half the sun's diameter, the rest being hidden by the interposition of the moon. If the observer moves from B to C, or from E to D, the sun will be more and more withdrawn from his sight, until it becomes wholly invisible in the shadow itself: whence it is plain, that there may be a solar eclipse, although the shadow of the moon does not touch the earth, if the penumbra comes to its surface.

When the moon's shadow falls upon the earth, it is

called a total eclipse of the sun; if the penumbra only reaches the earth, it is called a partial eclipse of the sun: with respect to particular places, it is said to be total where the shadow passes; central, where the centre of the moon covers that of the sun; and partial, where the penumbra only passes by, as represented in *fig. 3.*

The wider the shadow CD (*fig. 2.*) is, the longer the sun will be totally eclipsed, and a larger space of the earth will be involved in the shadow; but its breadth will vary, as the distance of the moon from the earth, and of the earth from the sun, is different: for when the earth is in perihelion, and the moon in apogee, that is, the greatest distance from the earth, the shadow of the former does not reach the latter, nor does the moon cover the sun: this is called an annular eclipse, and is represented in *fig. 1.*

*Geometrical Construction of Solar ECLIPSES.* The geometrical construction of solar eclipses for particular places, depends upon the following lemmas:

Lemma I. To an observer in the sun the earth's enlightened hemisphere would appear a superficial disk: to him the several parts of land and water would directly appear as if projected on a plane; consequently, if circular lines, such as the meridians, parallels, &c. were drawn or imagined upon it, there may be conceived an orthographical projection of the sphere.

II. Every place upon the earth's surface, to the eye as above, in each diurnal revolution, apparently describes an elliptical path, or otherwise a right-line, parallel to the equator; the axis of which, at different times of the year, is variously inclined to the right, or to the left, from the axis of the ecliptick; that is,

III. During the sun's progress through the summer and autumn signs, to wit,  $\varpi$ ,  $\Omega$ ,  $\Upsilon$ ,  $\varphi$ ,  $\mu$ , and  $\epsilon$ , the axis of the earth projected on the above plane lies to the left of the axis of the zodiack; but if the sun be in any of the other opposite signs, it will on the contrary be thrown to the right. If the sun's place be in any of the north signs, that is  $\gamma$ ,  $\delta$ ,  $\pi$ , &c. the north pole will be enlightened; but if otherwise, to the south, it will be obscure.

Corollary. The conjugate diameter of every elliptical path apparently increases and decreases, as the sun's declination doth increase or decrease. If the sun is in the equinoctial, the path of each vertex will then be a right-line, but at all other times orbicular.

It is to be observed, that the transverse diameter of the ellipsis, representing the path of any place, is always equal to twice the sine complement of the respective latitude; and the conjugate one to the difference of the sines, betwixt the sum and difference of the two complements, latitude, and the sun's declination.

Prob. I. To represent the path of any vertex on the earth's disk, as viewed from the sun.

The general rule. Having drawn a circle, as ABCD (*plate XXX. fig. 7.*) let it be supposed to be the earth's enlightened disk; then, by two right lines passing through the centre, cross it at right angles; so will one of them represent a part of the ecliptick, as EC; the other its axis, as GH;  $\odot$  is the vertex point, or where the sun is in the zenith, and B and D the ecliptick pole in the solar horizon.

Now, as the obliquity of the ecliptick is nearly  $23^{\circ} 30'$ , set this distance from B both ways to I and K; then draw the line IK, and somewhere in it you will find the elevated pole thus: make half this line, namely, IL, equal to the radius of a line of sines, and upon it set off the sine of the sun's distance from the solstitial colures, which is here represented by the axis BD, from L, towards I or K, according to what quarter of the ecliptick the sun is in; that is to say, if the sun's longitude be given in  $\varphi$ ,  $\varpi$ ,  $\Upsilon$ ,  $\gamma$ ,  $\delta$ ,  $\pi$ , the said distance will be from L towards K; but if in any of the others, from L towards I. Thus let the sun be supposed in the beginning of Taurus, or at the end of Aquarius, the pole will be found at P; if in the former, it will be visible; if in the latter, invisible, being then remote and obscure; through which, and the centre of the disk, if you draw the line MN, it will represent the axis of the world; and in this case P will be the north pole.

When



When the south pole is elevated, it may easily be conceived, every plane lying in opposition, that the above rule will be reversed.

Again, to delineate the ellipsis which any given place upon the earth describes in 24 hours; if in north latitude, and the sun be in the northern signs (or the latitude and declination be of the same kind) or the difference southern (or the latitude declination be of a different kind) the sum of the sun's declination and the pole's elevation will be the diurnal intersection, or the sign of the sun's meridional distance that day from the path of the said place; and, for the nocturnal intersection of the same, the direct contrary, that is, if their sum be that, their difference will be this.

Thus, suppose I would represent the path of London in the foregoing figure, the sun being then in the last scruple of Aries, or at the beginning of Taurus, his declination at that time will be  $11^{\circ} 30'$  north; this added to and subtracted from the latitude  $51^{\circ} 32'$  north, he sun is  $63^{\circ} 2'$ , and the difference  $40^{\circ} 2'$ .

Make the semidiameter of the disk the radius of a line of fines, from which take those two last numbers separately, and place them upon the axis from the centre, O, towards the pole P, if illuminated, the former 12 will be the nocturnal intersection of the arch and meridian; the latter XII the visible one, or that of the day. Again, bisect that part of the axis 12 XII at right angles in R, and on this line place the sine complement of latitude both ways from R to VI and 6; thus will be had the extreme points of each diameter, through which the ellipsis or curve is to pass. Now to determine a sufficient number of other points, in order to be as near the truth as possible in protracting the said ellipsis, make R 6 and R XII each of the radius of a different line of fines: then, if from the first you take the fines in degrees from the meridian of such hours or parts of hours as are required to be shewn in the path, and place them severally in the same transverse diameter both ways, from R towards the horizon, and from the points so made, erect as many perpendiculars, such as  $20'$ ,  $5^{\circ}$ ,  $40'$ ,  $40'$ ,  $10^{\circ}$ ,  $20'$ ,  $1^{\circ}$ ,  $15'$ ,  $11'$ , &c. equal to the co-sine of the said arches, to each respectively taken from the other, or second scale, you will have 24 points or hours, with other sub-divisions, representing the true way an exact place of the said vertex, at any time of the day or night.

In like manner may be projected the parallel of the same place at any other time, and of various places at the same time, &c.

For calculating eclipses of the moon, the following data are necessary: 1. Her true distance from the node, at the mean conjunction. 2. The true time of the opposition, together with the true place of the sun and moon, reduced to the ecliptick. 3. The moon's true latitude, at the time of the true conjunction, and the distance of the luminaries from the earth: also their horizontal parallaxes, and apparent semi-diameters. 4. The true horary motions of the moon and sun, and the apparent semi-diameter of the earth's shadow. With these data it is easy to find the duration, beginning, middle, and quantity of eclipses.

**ECLIPTICK**, in astronomy, is that circle which the plane of the earth's orbit would mark out, were it supposed to be extended to the heavens; and consequently is that circle which the sun seems to describe in its annual course.

Having once settled the ecliptick, it is evident that as all the orbits of the planets about the sun are not in one plane, but each of the planets seen from the sun makes an excursion sometimes on this side, sometimes on that side of the way of the earth, marked among the fixed stars; so that the planets seen from the earth, make an excursion sometimes on this side, sometimes on that side of the ecliptick, and even in the same points of their orbits seem to run off variously, according to their different situation of the earth. But their greatest excursion is contained within the boundaries of ten degrees; the astronomers therefore have called that tract which the sun, moon, and planets, seem to adorn with their motions, and which is a zone or belt  $20^{\circ}$  broad, (ten on each side of the ecliptick) by the name of the zodiack,

from the images of animals, which the fixed stars, in that tract seem to represent. The number of the images pitched upon by them is 12; either because this number seems the fittest, for its being divisible into parts without a remainder, as 2, 3, 4, 6, and 12; or because, while the sun seems to run through the zodiack in the space of a year, there happen near upon 12 lunations, or the moon runs through all her phases 12 times. These parts of the ecliptick and zodiack are called signs, and their marks are Aries  $\text{♈}$ , Taurus  $\text{♉}$ , Gemini  $\text{♊}$ , Cancer  $\text{♋}$ , Leo  $\text{♌}$ , Virgo  $\text{♍}$ , Libra  $\text{♎}$ , Scorpio  $\text{♏}$ , Sagittarius  $\text{♐}$ , Capricornus  $\text{♑}$ , Aquarius  $\text{♒}$ , Pisces  $\text{♓}$ . Every one of these signs is again divided into 30 equal parts, so that the whole circle (like all others) is divided into 360. Though the ecliptick, or any other circle, has no beginning nor ending, properly speaking; yet astronomers begin their reckoning from the first point of Aries, which the sun is seen in when the days and nights are equal, and spring begins to the inhabitants of the northern hemisphere, which also is the point of the common intersection of the ecliptick and equator. The reckoning is made from  $\text{♈}$  to  $\text{♉}$ ,  $\text{♊}$ , and so on till a return is made to  $\text{♈}$ , then beginning again towards the same way that the sun seems to move about the earth. And the motion or progress this way is said to be in *consequentia signorum*, or according to the order of the signs; namely, that according to which the sun, moon, and almost the rest of the planets seem to move: but that phenomenon, which is carried in the contrary order, or from  $\text{♉}$ , to  $\text{♈}$ , or from  $\text{♈}$  to  $\text{♓}$ , is said to be moved contrary to the order of the signs, or in *antecedentia*.

Because the axis of the earth, after several revolutions about the sun, goes a little off from a site parallel to that it formerly had, describing the superficies of a cone, the images of the stars have removed from the signs of the zodiack, to which they originally gave names. And this happens not upon the account of the motion of the stars or the ecliptick, but because the equator of the earth is moved together with the axis of the earth, so as that the intersections of the celestial equator, with the ecliptick or equinoctial points (and consequently all the points of the ecliptick, as they are expressible by numbers) remove in *antecedentia*; and the images or the fixed stars seem to be transferred, in respect of them, in *consequentia*.

If innumerable circles be supposed to be drawn through the poles of the ecliptick, cutting the ecliptick at right angles, which are called secondaries, any point in the heavens may be referred to the ecliptick, by the help of them; that is, any phenomenon is understood to be in that point of the zodiack or ecliptick, in which such a semicircle, passing through the phenomenon, cuts the ecliptick. And the phenomena that are after this manner referred to the same point of the ecliptick, are said to be conjunct, or in conjunction; but such as are referred to the opposite points are in opposition. If a quarter of the ecliptick be between the points to which the appearances are referred, they are said to be in a quartile aspect; if a third part, a trine aspect; and if a sixth part, in a sextile aspect.

An arch of the ecliptick, intercepted between the beginning of Aries, and reckoned according to the order of the signs, is called the longitude of that phenomenon or point, as the arch of a secondary intercepted between the ecliptick and the said phenomenon or point of the heavens, is called its latitude; on which account these secondary circles are called circles of latitude. The latitude is either north or south, according as the object is to the northward or southward of the ecliptick.

The obliquity of the ecliptick, is one of the most important elements of astronomy, because it becomes one of the data in the calculation of spherical triangles, wherein either the ecliptick or equator are concerned. This obliquity is equal to the sun's greatest declination, or when he is in the tropicks. The meridian altitude must therefore be observed with a good instrument on the day of the solstice, and the height of the equator at the place of observation, subtracted from the meridian altitude will give the declination of the tropick. Or observe the sun's meridian altitude in each tropick;



the difference between these altitudes will be the distance between the two tropicks, half of which is the distance of each tropick from the equator, or the obliquity of the ecliptick. This, according to a mean between the observations of Flamsteed, Godin, Cassini, and Bradley, is  $23^{\circ}. 28'. 27''$ .

**ECLOGUE**, in poetry, a kind of pastoral composition, or a small elegant poem, in a natural simple style. See **PASTORAL**.

The eclogue, in its primary intention, is the same thing with the idyllium, but custom has made some difference between them, and appropriated the name eclogue to pieces wherein shepherds are introduced, and idyllium to those written like eclogues, but without any shepherds in them. The eclogue then is properly an image of pastoral life, upon which account the matter is low, and its genius humble. Its business is to describe the loves, sports, piques, jealousies, intrigues, and other adventures of shepherds; so that its character must be simple, the wit easy, and the expression familiar. Then the true character of the eclogue is simplicity and modesty; its figures are neat, the passions tender, the motions easy, and though sometimes it may have little transports, and despairs, yet it never rises so high as to be fierce or violent. Its narrations are short, descriptions little, the thoughts ingenious, the manner innocent, the language pure, the verse flowing, the expressions plain, and all the discourse natural.

The models in this sort of poetry are Theocritus and Virgil, who both have some eclogues of a lofty character. The eclogue therefore occasionally raises its voice: yet M. Fontenelle blames some modern poets for having made matters of high concern the subject of some of their eclogues, and caused their shepherds to sing the praises of kings and heroes. The Italians are thought faulty in this respect, for aiming generally to be too witty or superb in their style: however, since the establishment of the academy of Arcadians at Rome, the taste for eclogues has been greatly improved amongst them. Some imagine the name eclogue to have been originally applied to such poems as were wrote in imitation of others: such are the eclogues of Virgil which are only imitations of Theocritus.

**ECLOGUE**, is also used to signify an extract or collection of certain compositions in prose. Such are the eclogues of Strabo, Diodorus, &c.

**ECPHORA**, in architecture, implies the interval or distance between the extremities of two members.

**ECPHRACTICKS**, in physick, medicines that attenuate and remove obstructions.

**ECPIESMA**, in surgery, a sort of fracture of the cranium, when the bones are much shattered, and by pressing inwardly affect the membranes of the brain.

**ECPIESMA**, in pharmacy, implies the magma, or mass remaining after the juice of vegetables have been pressed out.

**ECTHESIS**, in ecclesiastical history, implies a confession of faith composed by Sergius, patriarch of Constantinople, and published in the form of an edict by the emperor Heraclius, in the year 639.

**ECTROPIUM**, in surgery, is when the eye-lids are inverted, or retracted so as to shew their internal or red surface, and cannot sufficiently cover the eye. Sometimes this is a simple or original disorder, and sometimes only a symptom, or consequence of another, as an inflammation, sarcoma, tumour, &c. When the disorder is simple, or original, it generally arises from a contraction of the skin of the eye-lid, by the scar of a wound, ulcer, burn, &c. or from an induration and contraction of the skin after an inflammation; and sometimes it may proceed, in a great measure, from the use of astringent collyria injudiciously applied, in disorders of the eyes.

**ECTYLOTICKS**, in pharmacy, remedies proper for consuming callosities.

**EDDISH**, in husbandry, the latter pasture, or grass that springs up after mowing or reaping.

**EDDY**, is when part of a stream of water is, by some impediment, stopped in its natural current, and runs back contrary to the motion of its stream.

**EDDY-WIND**, that which returns, or is beat back from a sail, mountain, or any other object that hinders its passage.

**EDGINGS**, in gardening, a series of plants set joining to each other round the edges or borders of flower beds. The principal use of edgings is to keep the earth in borders adjoining to gravel walks from being washed down in heavy showers, and thereby fouling the gravel; for which purpose there is no plant so proper as the dwarf Dutch box; though others are made use of as daisies, thrift, thyme, &c. but as these are liable to decay in patches, and require annual or at least biennial replanting, we cannot much recommend them; but for those who are fond of an edging that bears flowers, there are none more agreeable than the double pheasant eyed pink, or double daisy.

**EDICT**, *Edictum*, in matters of polity, an order or instrument, signed and sealed by a prince, to serve as a law to his subjects.

**EDIFICE**, the same with building. See **BUILDING**.

**EDITOR**, a person of learning, who has the care of an impression of any work, particularly that of an ancient author.

**EDUCATION**, the instructing children, and youth in general, in such branches of knowledge and polite exercises, as are suitable to their genius and station.

Education is a very extensive subject, that has employed the thoughts and pens of the greatest men: Locke, the archbishop of Cambray, Tanaquil Faber, M. Croufaz, Rollin, and Rousseau, may be consulted on this head.

The principal aim of parents should be, to know what sphere of life their children are designed to act in; what education is really suitable to them; what will be the consequence of neglecting that; and what chance a superior education will give them, for their advancement in the world. Their chief study should be to give their children such a degree of knowledges, as will qualify them to fill some certain post or station in life: in short, to fit them for an employment suited to their condition and capacity, such as will make them happy in themselves and useful to society.

**EDULCORATION**, in pharmacy, the same with dulcifying. See **DULCIFYING**.

**EDULCORATION**, in chymistry, is the sweetning or clearing any matter from impurities, especially the salts with which it may be impregnated, by washing it thoroughly in common water.

**EEL**, the name of a fish too well known to need any description.

**EEL-SPEAR**, a forked instrument with three or four jagged teeth, used for catching eels.

**EFFECT**, the result proceeding from any cause. See the article **CAUSE**.

**EFFECTIONS**, among geometricians, imply the same as construction of propositions, and often of problems and practices, which, when they are founded upon some general propositions, are called the geometrical effection belonging thereto.

**EFFERVESCENCE**, in a general sense, signifies a slight degree of ebullition in liquors exposed to a due degree of heat: but the chymists apply it to that intestine motion excited in various fluids, either by the mixture of fluids with others of a different nature, or by dropping salts, or powders of various kinds into fluids.

The two most common opposites, acids and alkalies, on being mixed, cause a great ebullition, or frothing, but no great heat: but the solution of some metals in aquafortis, cause intense heat, and emit flame. The mixing aromack oils with acid mineral spirits, actually kindle and burn with violent explosions: and some vegetable substances, putrifying with moisture, will, sometimes, heat so as to kindle whatever lies dry about that part of the heap where the putrefaction happens.

Hence, effervescences are distinguished into hot and cold; that which produces heat in the substances so mixt, is called a hot effervescence, but if no heat is excited, it is called a cold effervescence. Among the mixtures that excite a cold effervescence, is that of powdered coral mixed with distilled vinegar; which is accounted for thus, by Chauvin, that the pores of the



coral being very great, it may be easily dissolved in the acid spirit, without any great friction, or collision of the parts, such as would be necessary to generate any considerable heat.

**EFFLORESCENCE**, among physicians, the same with exanthema. See **EXANTHEMA**.

**EFFLUVIA**, the minute particles that exhale from bodies.

**EFT**, the English name of the common lizard called also the newt and swift.

**EGG**, *Ovum*, in natural history, a body formed in certain females, in which is contained an embryo, or foetus of the same species, under a shell or cortical substance.

**EGG**, in architecture, an ornament in that form, cut in the echinus or quarter round of the Ionick and composite capitals.

**EGG-PLANT**, *Melongena*, in botany. See the article **MELONGENA**.

**EGLANTINE**, in botany, a name frequently given to the sweet-briar.

**EJACULATOR**, in anatomy, a muscle of the penis, otherwise called the elevator.

**EJECTION**, in the animal œconomy, implies evacuation, or the discharging any thing through some of the emunctories, as by stool, vomit, &c.

**EJECTMENT**, *Ejectione firmæ*, in law, a writ or action which lies for the lessee for years, on his being ejected, or put out of his land before the expiration of his term, either by the lessor or a stranger. It may also be brought by the lessor against the lessee, for rent in arrears, or holding over his term, &c.

Ejectment of late years is become an action in the place of many real actions, as writs of right, formidons, &c. which are very difficult, as well as tedious and expensive; and this is now the common action for trial of titles, and recovering of lands, &c. illegally held from the right owner, yet where entry is taken away by descents, fines, recoveries, disseisins, &c. an ejectment shall not be brought; whereby we find that all titles cannot be tried by this action.

**ELABORATORY**, a place where chymical operations are performed, generally called laboratory. See the article **CHYMICAL Laboratory**.

**ELÆOSACCHARUM**, in pharmacy, a mixture of essential oils with sugar.

**ELASTICK**, an epithet applied to all bodies endowed with the property of elasticity. See next article.

**ELASTICITY**, that property of bodies whereby they restore themselves to their former figure, after being bent by any external force.

Thus a spring, or bow, when bent, restore themselves, by their elasticity, to the form they obtained before any external force was applied to them. And thus the arteries of an animal body, after being distended by the impulse of the blood, contract and restore themselves, by their elasticity, to the same form and dimensions they had before they were distended. Some have endeavoured to solve elasticity by attraction only; as for example, if the string *AB* (*plate XXVIII. fig. 2.*) be considered as made up of particles lying over one another in the manner represented at *ADB*; it is plain that, if the point *D* be forcibly brought to *C*, the parts will be pulled from each other, and when the force that stretched the spring ceases to act, the attraction of cohesion (which was hindered before) will take place, and bring back the string to its former length and situation, after several vibrations. Now, though this seems to agree pretty well with the phenomena of a string in motion, it will by no means solve the elasticity of a spring fastened to one end, and bent either way at the other, like a knife or sword-blade. For if such a spring be bent from *A* to *a*, *fig. 3.* the particles on the side *C*, which now became convex, will be further asunder at *F*, while the particles at *D*, carried to the concave part *E*, will come closer together; so that the attraction, instead of making the spring restore itself, will keep it in the situation in which it is, as it happens in bodies that have no elasticity, where, perhaps, only attraction obtains. Thus a plate of lead, a plate of copper, and a plate of soft iron stand bent.

But the most probable way of solving the elasticity of springs, is to consider both a repulsive and an attractive property in the particles, after the manner of the black sand, which is attracted by the load-stone, and has been shewn by the learned and ingenious professor Petrus Van Muschenbroeck to be nothing else but a great number of little load-stones.

May not a spring of steel, or other springs, consist of several series of such particles, whose polarity and attraction acting at the same time, will shew why such bodies, when they have been bent, vibrate and restore themselves?

If we take a plate of steel, and make it so hot till it looks white, and immediately quench it, we thereby fix the metal in a state very near fluidity; so that the particles which the fire had almost brought to roundness, have but a very small contact, as appears from the fragility of the steel thus hardened, which breaks like glass, and has a short grain. Steel thus hardened is highly elastick; for what workmen call hard is most elastick, as appears from the congress of steel bars greatly hardened, which return in their rebound nearer the place from whence they fell than those which are less hard, and have, next to glass, the quickest elasticity of any body we are acquainted with.

**ELATINE**, **FLUELLIN**, in botany, an annual plant which grows naturally among corn in several parts of England. It hath a white, single, descendent, slender root, with few fibres. The stalk is slender, and trails on the ground: this is hairy, and furnished with acuminate leaves, which are placed alternately with very short pedicles; at each joint proceeds a single flower of the ringent kind, ending in a tail behind, and in the fore part divided into two lips; the upper one of a yellow colour, and the under one purple. The flowers appear in June and July, and the seeds ripen in autumn.

The plant is used in medicine, and is accounted a great vulnerary, and good for hæmorrhages of all sorts. It is also said to cure the gout, cancers, leprosy, and king's evil.

**ELBOW**, in anatomy, the juncture of the cubitus and radius, or the outer angle made by the flexure or bend of the arm.

**ELBOW**, in architecture, a term used for an obtuse angle of a wall, building, road, &c. which divides it from its right-line.

**ELDER**, in botany. See the article **SAMBUCUS**.

**ELEATICKS**, a sect of ancient philosophers founded in Elea by Xenophanes, who held all things to be incomprehensible.

**ELECAMPANE**, the name of a perennial plant, growing wild in many parts of England, flowering in June. Botanists consider it as a species of asperula, or starwort. See the article **ASTER**.

Elecampane is considered as a stomachick, alexipharmick, and sudorifick, and therefore prescribed in crudities of the stomach, coughs, the asthma, plague, and other contagious diseases.

**ELECTOR**, a person who has a right to elect or choose another to an office, &c. But the word is, by way of eminence, applied to those princes of Germany, in whom the right of choosing the emperor is deposited, being all sovereign princes, and the principal members of the empire.

**ELECTRICITY**, in physiology, that property of certain bodies, whereby, after being rubbed, excited, or heated in some particular degree, they acquire a power of attracting and repelling other remote bodies; and frequently of emitting sparks and streams of light.

The ancients, having observed that amber, which they called electrum, upon being rubbed, attracts bits of straw, down, and other light bodies, first gave this property the name of electricity, which they thought peculiar to amber and a few stones mentioned by Theophrastus, Pliny, and some others. But the philosophers of the last, and more particularly of the present age, have found that numbers of other bodies possess this quality; and made so many discoveries in electricity, that there is scarce any other subject in natural philosophy that has given occasion to more experiments.

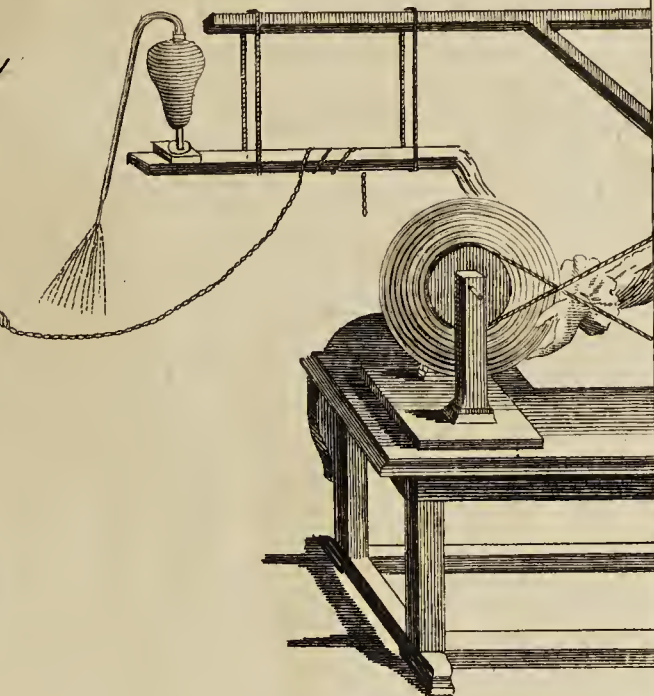
This quality is of two sorts, viz. vitreous electricity,



Fig. 1. Electricity



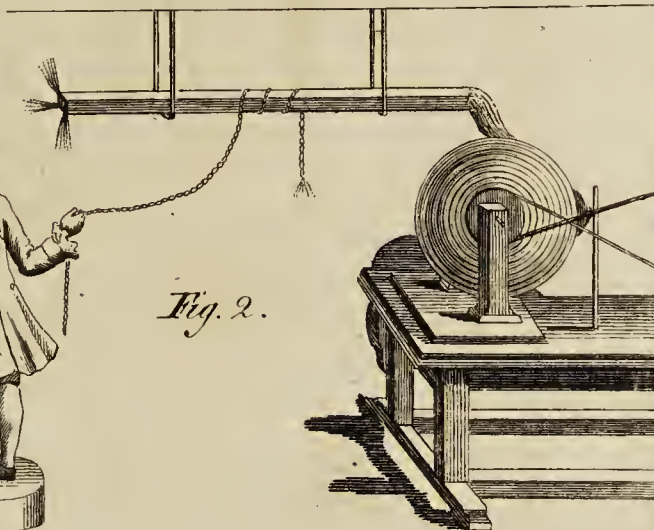
Electricity  
Fig. 9.



Electricity  
Fig. 8.



Fig. 2.



Electricity  
Fig. 7.

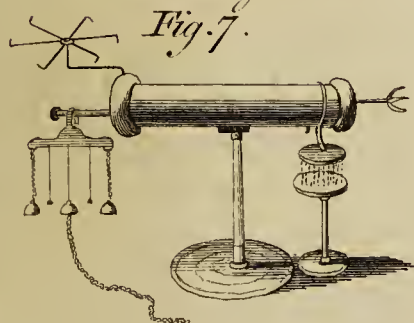


Fig. 3.

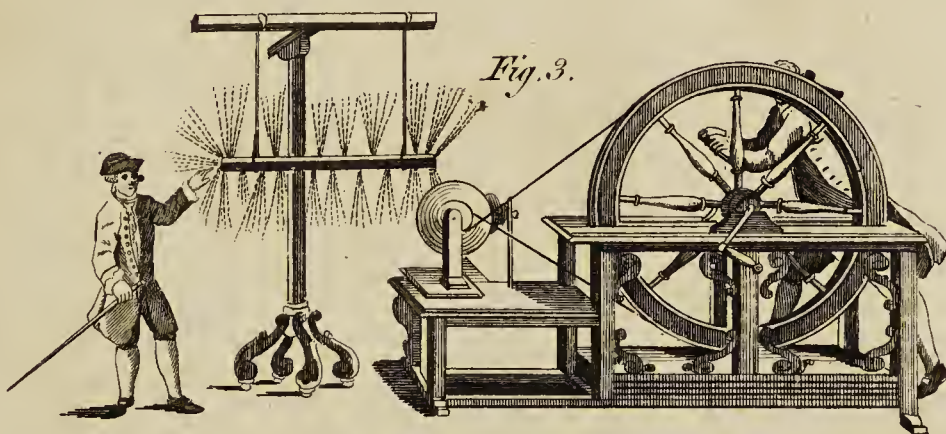
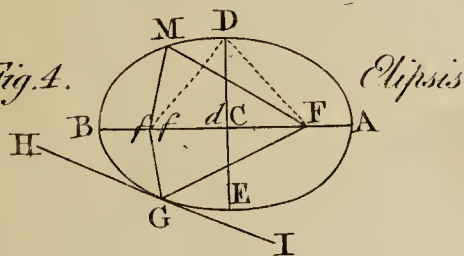
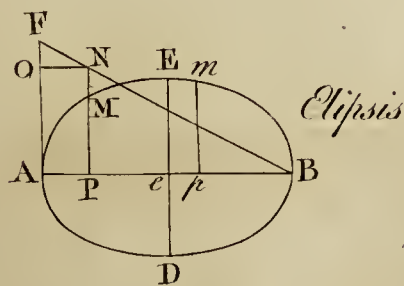


Fig. 4.



Ellipsis

Fig. 5.



Ellipsis

Fig. 6.

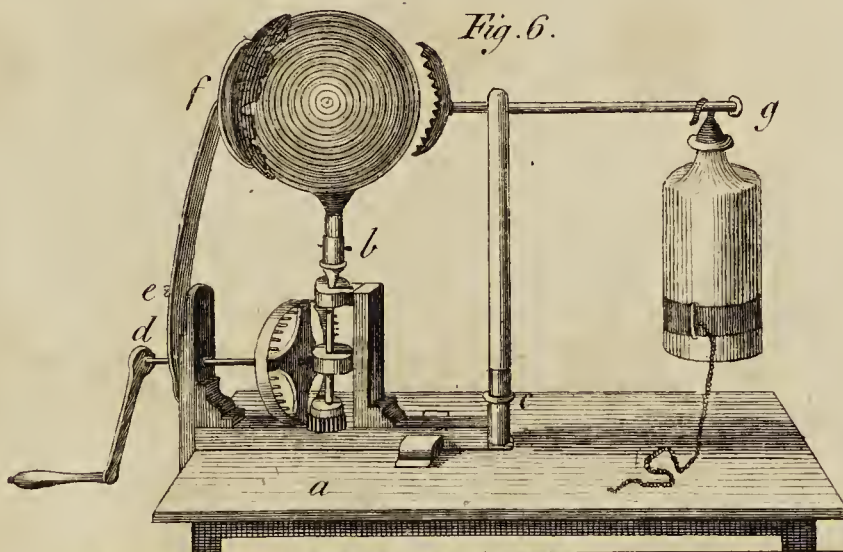








Fig.1. Eclipse



Fig.2. Eclipse

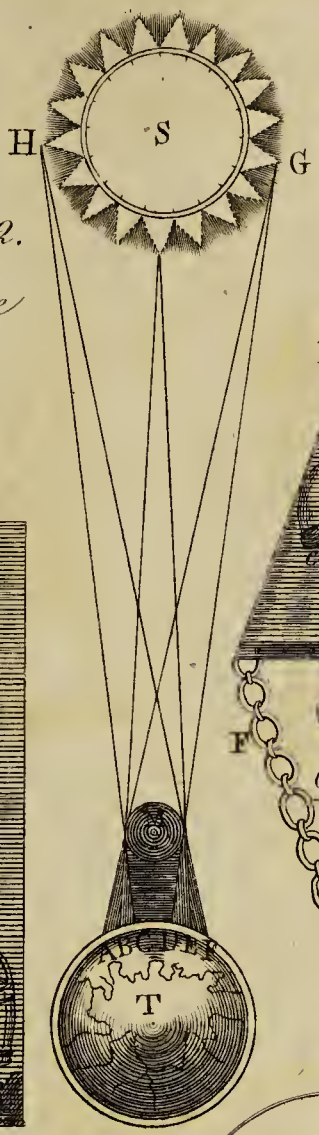


Fig.3. Eclipse

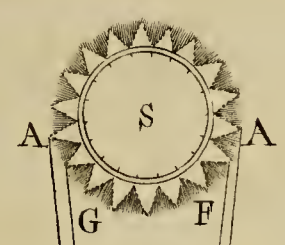
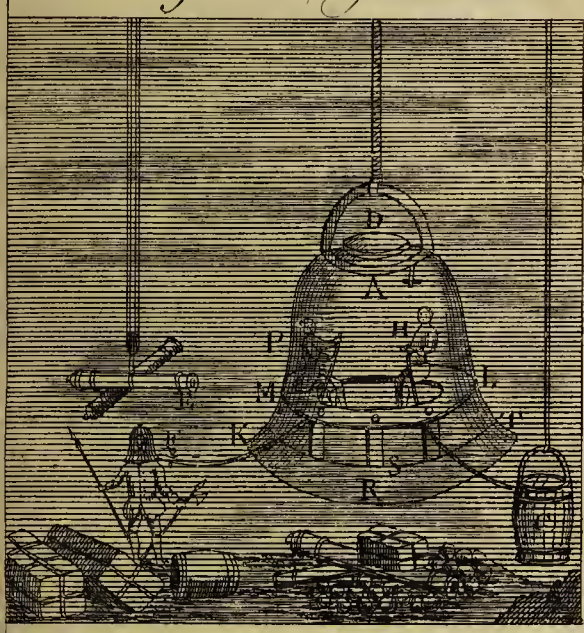


Fig.4. Eclipse



Fig.5. Diving Bell



Diving Bell Fig. 6.



Fig.12. Electricity

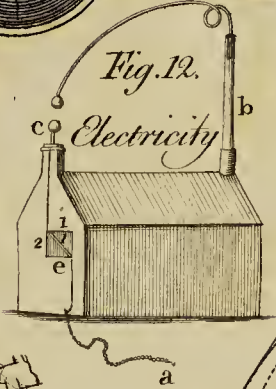


Fig.7. Earth

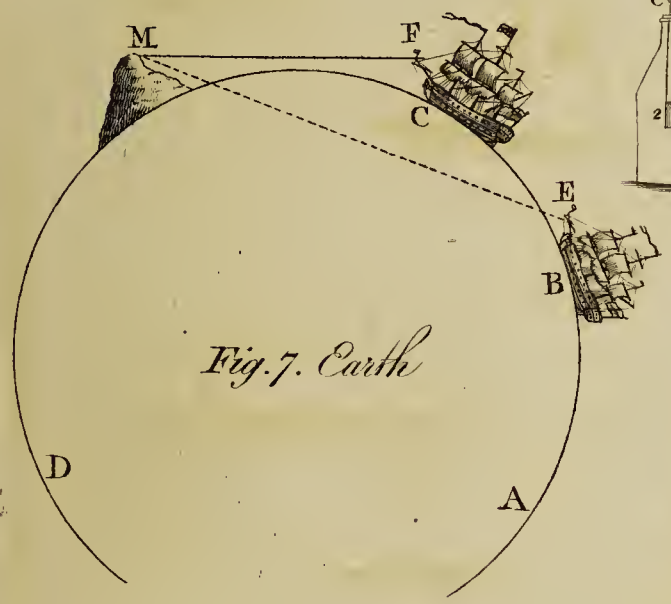


Fig.8. Earth

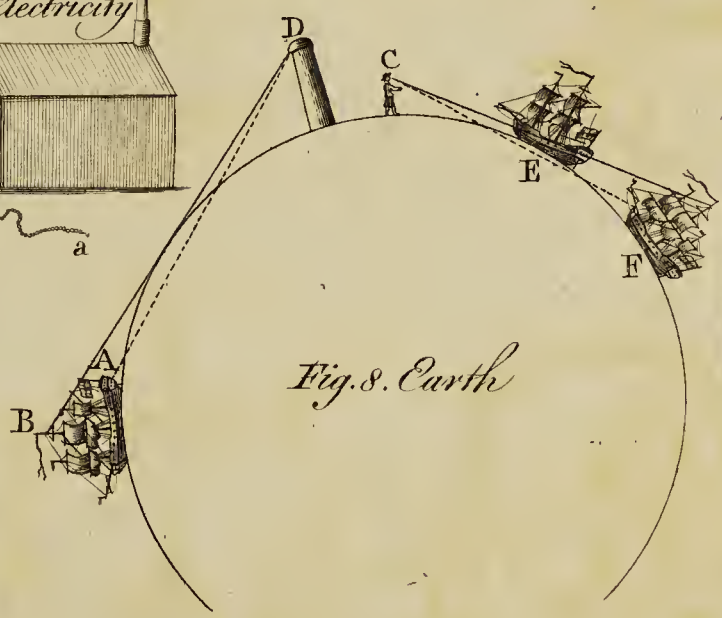


Fig.9. Echo

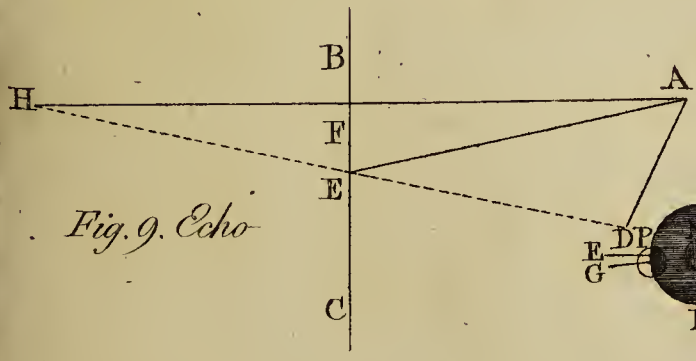


Fig.10. Eclipse

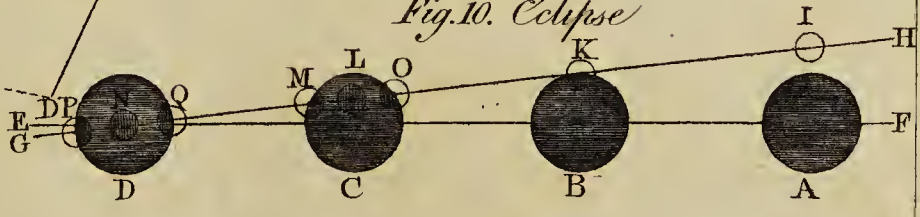
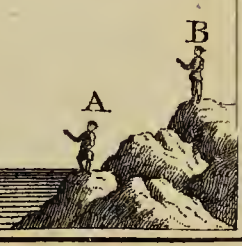


Fig.11. Earth



Earth









or that which belongs to glass; and resinous electricity, or that which belongs to amber, rosin, wax, gum, and such like substances.

The bodies susceptible of electricity, are also divided into two classes: the one are electrical of themselves, or *electrica per se*; that is, they contain that quality in themselves, and need only be rubbed, &c. to excite it: the others do not contain that virtue in themselves, or they have so little of it, as to be reckoned to have none at all; yet they acquire it by communication, or by emanation derived to them by a body that is electrical *per se*: those bodies are simply called non-electricks, or non *electrica per se*.

The electricks *per se*, or as they are otherwise called, the originally electricks, are, according to Muschenbroeck, all sorts of gems, several stones, all crystals and resinous substances, sulphur, red arsenick, salts, alum; all sorts of glass, porcellane, dried vegetables; all woods, ropes, threads of lint, paper, the leaves of trees, the harder resins, pitch, cotton; parts of animals, as their feathers, hair, horns, bones, ivory, whale-bone, the hide, parchment, the shells of fishes, silk, strings made of dried guts, gum, sealing-wax, feathered or hairy living animals, as cats, dogs, cocks, &c.

The non-electricks are several naked animals, or such as are covered with neither hair nor feathers; metals, semi-metals, earths and dust, which, by reason of its minuteness, won't bear to be rubbed separately; all watry gums, opium, galbanum, ammoniack, assafoetida, camphor; all sorts of bodies that liquify with a small heat, all moist bodies, all fluids which will not bear rubbing, &c.

Electricity, according to the same author, consists in subtle exhalations, which, in exciting the electrical body, are put into motion; and which, by flying to and from it, agitate all those light bodies that fall within the sphere of their attraction.

That these exhalations, or subtle effluvia, constitute electricity, appears from hence. 1. From the touch, as these bodies are perceived to be surrounded with a most subtle atmosphere, or covered with a gentle blast of wind, that continues to breathe every where around them. 2. From that offensive smell, which resembles phosphorus, the phlegm, of aqua regia, or the spirit of vitriol. 3. Being taken into the mouth, they yield an acid and astringent taste. 4. They seem to adhere to the extremities of the bodies which they surround, and from which they recede, in the form of sparks, and of a subtle lucid flame. 5. This flame is sometimes attended with an explosion, that may be heard at the distance of two hundred paces: besides, the greater flames occasion a continued hissing, or crackling noise in the air. Since, therefore, the electrical effluvia affect all the human senses, we can no longer doubt of their being a corporeal fluid.

Mr. Watfon thinks, that electricity is not furnished from the electrick bodies employed in the experiments, nor from the circumambient air; but that it is the effect of a very subtle and elastic fluid occupying all bodies, in contact with the terraqueous globe; that every where, in its natural state, it is of the same degree of density; that glass and other bodies, which are electricks *per se*, have the power of taking this fluid from one body and conveying it to another, in a quantity sufficient to be obvious to all our senses; that under certain circumstances, it is possible to render the electricity in some bodies more rare than it naturally is, that, by communicating this to other bodies, to give them an additional quantity, and make their electricity more dense; and that these bodies will thus continue, until their natural quantity is restored to each; that is, by those which have lost part of theirs, acquiring what they have lost, and by those to whom more has been communicated, parting with their additional quantity. Both one and the other of these is, from the elasticity of the electrick matter, attempted to be done from the nearest non-electrick; and when the air is moist, this is soon accomplished by the circumambient vapours, which here may be considered as preventing, in a very great degree, our attempts to insulate non-electrick bodies.

In order to illustrate phenomena of electricity, we shall give some select experiments.

1. Get a glass tube A B, of about three feet and a half in length, an inch and a half in diameter; and its sides a line thick: rub it with a piece of stuff, paper, or, which is still better, with the hand, provided it be very dry: you will succeed better if your hands be rubbed with chalk, or white lead. Afterwards bring this rubbed tube near any light bodies, as gold-leaf laid upon a glass stand C D; then will the gold-leaf be attracted and repelled in the manner represented in (*plate XXX. fig. 1.*)

If you do this in such a manner, that the gold-leaf, for example, be perpendicularly repelled above the tube, and that it meet with no other body, it will sustain itself in the air, always at the same distance from the tube, and may be conveyed in this situation quite round the room; but if it touch any other body, it will come back and adhere to the tube, and then it will be repelled anew as at the first.

2. Again, if the tube be rubbed anew, pretty briskly, it will attract a feather, or other light body, at a considerable distance; and after they have stuck to it for some time, they are again driven off, and it will constantly repel them, till they are touched by some other non-electrical body, as a finger or stick: on which they will be again attracted by the tube; and if the finger be held pretty near the tube, the feather will alternately fly from the tube to the finger, and back again; always stretching out its fibres the way that it is going, and that before it comes off from the finger or tube. (*See plate XXX. fig. 2.*)

Before we proceed to more complicated experiments, it will be proper to observe, that, in order to know that non-electricks have received the communicated electricity, they must be insulated: that is, they must not be suspended from, nor supported by any body, but what is an electrick *per se*. For if one non-electrick be touched by another, and this by a third, &c. all the electricity received by the first will go to the second, and from this to the third, &c. till at last it be lost upon the ground. But, if several non-electrick bodies, touching one another, are at length terminated by electrick bodies, in that respect they make but one body, and receive and retain electricity for some time. From hence it may be observed, that non-electricks are conductors of electricity. Water conducts it very well, but metals are the most convenient conductors.

3. Let an iron-rod, pointed at one end, be suspended, on silk lines, and by means of a glass or rosin-sphere (which can be more regularly and constantly excited than a tube) be electrified, it will be found to have all the properties of the excited tube already mentioned: that end of the iron-rod, suspended as already mentioned, which is next the sphere, must point to it at the distance of a quarter of an inch. This apparatus being disposed, as represented, (*plate XXXI. fig. 3.*) the globe will be electrified in whirling round against a leather cushion rubbed with whiting, or dry hand-rubbed in the same manner. When the rod, by this means, is strongly electrified, a stream of light, in diverging rays, will be seen to issue from that point of it which is most distant from the sphere; and if any non-electrick body, as a finger, be placed within a quarter of an inch of the said flame, it will perceive a gentle blast of wind from the end of the iron; that is, the electrical fire will issue out from the point in such a manner, as to blow against the finger very sensibly; and if the finger be still held nearer, the large pencil of rays will be condensed in such a manner, as to run out from the point upon the finger, in a stream or body of dense, yellow fire, and strike the finger like a gentle jet d'eau. The rod suspended before the glass-sphere, is properly termed the prime conductor in this machine.

4. While the flame continues to appear from the end of the iron-rod, the finger being placed any where upon it, the flame at the end disappears immediately; and when the finger is taken off, it again instantly appears; and so by putting the finger off and on successively, the electrick flame will appear and disappear alternately. These eruptions of the electrical fire will snap very sensibly, both to the eye and the ear, upon any part of the rod that the finger is pointed to. See *plate XXXI. fig. 3.*

5. If a chain, or hempen cord, be suspended by thicken strings



things all round the room, of any length you please, and one end thereof be hung, by a loop, across the rod. the electrical fire will instantly be transmitted through the whole length of the chain, and appear upon every part at the approach of the finger, and be heard to snap and strike with as great force as from the rod itself.

6. Take two plates of metal, very clean and dry, whose surfaces are nearly equal; hang one of them horizontally to the electrified rod, and bring under it, upon the other, any thin light body, as silver leaf, &c. When the upper plate is made electrical, the silver will be attracted by it, and if the under plate is held at a proper distance, will be perfectly suspended at right angles to the plates, without touching either of them; but if they are either brought nearer together, or carried further asunder, the leaf will cease to be suspended, and will jump up and down between them.

The same effect will be produced, if the experiment is reversed by electrifying the bottom plate, and suspending the other over it.

7. The following improvement, upon the electrical machine of the abbe Nollet, already exhibited, was made by Mr. Watson in 1746. In the periphery of his machine, (See plate XXX. fig. 4.) were cut four grooves, corresponding with four globes, which were disposed vertically: one, two, or the whole number of these globes might be used at pleasure. They were mounted upon spindles, and the leather-cushion with which they were rubbed, was stuffed with an elastick substance, as curled hair, and rubbed over with whiting. One of the globes was lined to a considerable thickness with a mixture of wax and rosin, but no difference appeared in the power of this globe from the others.

For performing most of the following experiments, some have imagined a gun-barrel absolutely necessary, as the prime conductor; but Mr. Watson says, that a solid piece of metal, of any form, is equally useful; having observed the stroke from a sword, as violent as that from a gun-barrel.

If, to the suspended barrel, a sponge thoroughly dry, be hung, it gives no appearance of fire, which shews it to be an electrick substance; but if when the sponge has been immersed in water, it be suspended to the barrel, and the finger applied near it, the fire issues out with considerable force and snappings; and the drops, which, before the sponge was applied, fell very slowly, will now fall as fast: if the room be darkened, these will appear to be drops of fire, and illuminate the basin into which they fall.

8. If a phial of water is suspended to the prime conductor by a wire, let down a few inches into the water through the cork; and some metallick fringes, inserted into the barrel, touch the globe in motion, the electrical power may be so accumulated in the phial, that a man grasping it with one hand, and touching the gun-barrel with a finger of the other, will receive a violent shock through both his arms, especially at his elbows and wrists, and across his breast.

The commotion arising from the discharge of accumulated electricity in a phial, may be felt by a great number of men at once. M. le Monnier, at Paris, is said to have communicated this shock through a line of men, and other non-electricks, measuring 900 toises, being more than an English mile; and the abbe Nollet made the experiment upon 200 persons ranged in two parallel lines.

9. If the electrical machine, and the man who turns the wheel thereof, be mounted on electrical cakes, the electrical power is so far from being increased, that, on the contrary, it is so much diminished, as to be oftentimes not at all perceptible.

10. A person standing on a cake of rosin, holding a chain fastened to the prime conductor, will be electrized; that is, he will be all over possessed with electrick virtue; and, at the same time, feel nothing of it, unless some person standing by put his finger near to any part, and then the virtue will be emitted in form of fire, and snap and become very sensible to both the parties. (See plate XXXI. fig. 1.)

11. A person standing on rosin, holding the chain of the conductor, points his finger to the warm spirits

of wine; and by communicating the electrick fire thereto, kindles the rising vapour, and so sets the whole on fire. In this manner any sort of matter, which, when warmed, will send forth an inflammable vapour, will be set on fire. See fig. 2.

The electrical commotion, mentioned in experiment 8, arising from an accumulation of the electrical fire, has been made very sensible quite cross the river Thames, by the communication of no other medium than the water of that river, and spirit of wine fired at that distance.

By comparing the respective velocities of electricity and sound, that of electricity, in any distance yet experienced, appears instantaneous.

12. If the globe be exhausted of all its air, and then whirled about, the electricity will be observed to act wholly within the globe, where it will appear, in a darkened room, in form of a cloud or flame of reddish or purple-coloured light, filling the whole capacity of the globe.

13. If a loadstone, armed with iron, be hung on to the gun-barrel by an iron-wire, the electrick virtue will rush out from every part, but more forcibly from the iron than from the stone itself: for from the stone, it seems to be emitted in a more lax manner, and diffused in a sort of steam, or fiery vapour; whereas from the iron, it issues in a more impetuous, dense, and penetrating steam; by which we learn, that the two most considerable powers of nature, electricity and magnetism, do not always interfere, or impede each other's actions.

14. The method of firing gunpowder by the electrick flame, has something particular in it; as it does not require any inflammable vapour to be previously raised. The powder may be fired thus: a small cartridge is filled with dry powder, hard rammed, so as to bruise some of the grains: two pointed wires are then thrust in, one at each end, the points approaching to each other in the middle of the cartridge, till within the distance of half an inch: then the cartridge being placed in the circle, when four electrified glass-jars are discharged, the electrick flame leaping from the point of one wire to the point of the other within the cartridge, among the powder, fires it, and the explosion of the powder is at the same instant with the crack of the electrical discharge.

15. As to metals, Dr. Franklin tells us, that he has been able, by electricity, to give polarity to needles, and to reverse it. A shock from four large glass-jars sent through a fine sewing needle, gives it polarity.

16. In consequence of Dr. Franklin's hypothesis, of being able, by a proper apparatus, to collect the electricity from the atmosphere during a thunder storm, it has been found, that a pointed bar of iron, forty feet high, being placed upon an electrick body; and a stormy cloud having passed over the place where the bar stood, those, appointed to observe it, attracted from it sparks of fire, perceiving the same kind of commotions as in the common electrical experiments. The like effect followed when a bar of iron 99 feet high was placed upon a cake of rosin two feet square, and two inches thick: these were the first experiments made, but they have since been sufficiently varied and verified, so that it seems now certain, 1. That a bar of iron, pointed, or not, is electrized during a storm. 2. That a vertical, or horizontal situation, is equally fitting for these experiments. 3. That even wood is electrized. 4. That, by these means, a man may be sufficiently electrized to set fire to spirit of wine with his finger, and repeat almost all the usual experiments of electricity.

17. Dr. Franklin has contrived a very ingenious and easy method of trying experiments of this kind, by means of an electrical kite, made of a large thin silk handkerchief, extended and fastened, at the four corners, to two slight strips of cedar, of sufficient length for this purpose. This kite being accommodated with a tail, loop, and string, will rise in the air like those of paper. To the top of the upright stick of the cross, is to be fixed a very sharp-pointed wire, rising a foot or more above the wood. To the end of the twine, next the hand, is to be tied a silk ribband; and, where the twine and silk join, a key may be fastened. The kite



is to be raised when a thunder-gust appears to be coming on; and as soon as the thunder clouds come over the kite, the pointed wire will draw the electric fire from them, and the kite, with all the twine, will be electrified; and the loose filaments of the twine will stand out every way, and be attracted by an approaching finger. When the rain has wet the kite and twine, so that it cannot conduct the electric fire freely, it will stream out plentifully from the key on the approach of a man's knuckle. At this key a phial may be charged; and from the electric fire, thus obtained, spirits may be kindled, and all the other electrical experiments be performed, which are done by the help of a glass-sphere or tube; and the sameness of the electric matter with that of lightning, may thereby be completely demonstrated. But those who make experiments of this kind should be very careful how they approach the apparatus during thunder storms, lest their lives pay the forfeit of their temerity, as has been the case with one or two already.

From this identity some have conceived hopes of depriving the clouds of all their thunder, and thereby rendering thunder storms harmless. For which purpose conductors have been invented.

18. Mr. Stephen Gray, just before he died, hit upon an experiment which seemed to indicate, that the attractive power, which regulates the motions of the heavenly bodies, is of the electric kind. The experiment was thus: he fixed a large round iron-ball upon the middle of a large cake of rosin and wax; and exciting the virtue strongly in the cake, a fine feather, suspended by a thread, and held near the iron-ball, was carried round it, by the effluvia, in a circular manner, and performed several revolutions: it moved the same way with the planets, from west to east, and its motion, like theirs, was not quite circular, but a little elliptical.

These being most of the capital experiments hitherto exhibited in electricity, we shall conclude this article by mentioning some of the medicinal virtues lately attributed to this subject of philosophy. It has been pretended, that odours will pervade electrified globes and tubes of glass; and that the medicinal effects of drugs might likewise be transmitted this way; as also, that, if persons were to hold in their hands, or place under their naked feet, odoriferous or purging substances, and were then to be electrized, they would be sensible of the effects of these substances: but this seem now to be an imposition on the credulity of the world, no such effects having ever been perceived. However, it does not follow that medicinal advantages are not to be gained from electricity itself; so subtle and so elastic a fluid admitted in a large quantity into our bodies, as, from undoubted experience, it greatly heats the flesh and quickens the pulse, may more especially, when assisted with the expectation of success in the patient, in particular cases, be attended with advantages. In effect, we meet with some cures performed in paralytick cases, by the force of electricity.

The ingenious Mr. D. Hucheson, near Edinburgh, has made considerable improvements in the construction of electrical machines. *Plate XXXI. fig. 6.* represents his machine put together, and screwed down under the edge of the table *a*. The globe is four inches and a half in diameter, and every other part proportionable.

It is to be taken apart in the least time imaginable, and will lay in a very small box. The globe takes off by taking out the pin *b*; and the conductor and its stand at the joint *c*; the handle at *d*; and by easing the screw *e*, the cushion *f* may be taken off. *Fig. 7.* is a conductor for trying different experiments. *Fig. 8.* is a board with glass feet to stand upon, in order to be filled with fire, to have sparks of fire drawn from any part of the body, &c. *Fig. 9.* is a large vial, the top of which, at *a*, is placed at the end of the conductor *g*, in *fig. 6*.

*Plate XXXII. fig. 12.* is a house made of paste-board or wood, on which an experiment may be made, to shew the excellency of conductors to houses, &c. that they may not be struck with lightening: *a* is a chain to be hung to a large vial or two at the conductor; *b* is a glass tube, or slender piece of sealing wax, that goes

down to the bottom of the house, in the top of which is stuck a piece of wire, (that has a communication with the conductor, and) that reaches archwise to the other end of the house, over the conductor *c*, and acts as the lightning; for when a sufficient quantity of fire is collected, it will break upon the conductor at *c*; and if the window *e*, which is made square, be put in 1. to 1. the communication will not be interrupted, and the fire will go down to the ground without hurting the house; but if the window be put in with 1 to 2, the communication will then be interrupted and the windows drove out, and other parts of the house damaged.

**ELECTROMETER**, an instrument contrived for measuring the force of electricity.

**ELECTUARY**, in pharmacy, a form in which both officinal and extemporaneous medicines are frequently made. It may be considered as a number of boluses united together, but is made somewhat softer, by an addition of a due proportion of preserves or syrups. When the consistence is very soft, it is called, sometimes, by the name of opiata.

The principal consideration in prescribing officinal electuaries is, that such things only be put together, as will not, by any opposite qualities, destroy one another, or lose their natural properties, by lying long in this manner; and likewise that the whole be of a consistence that will hold ingredients of different gravities in equal mixture.

Extemporaneous electuaries differ principally from the officinal, in that the latter are confined to such things as will for a long time keep together; whereas the former may be ventured on with materials which will not remain long without change, provided they agree in intention; as conserves with the testaceous powders, preparations with steel, and the like, will continue together long enough for present use, but will not lie many days without fermenting and spoiling.

**ELEGIACK**, in ancient poetry, something belonging to elegy. See **ELEGY**.

**ELEGANCE**, or **ELEGANCY**, an ornament of politeness and agreeableness, shewn in any discourse, with such a choice of rich and happy expressions, as to rise politely above the common manners, so as to strike people of a delicate taste, and diffuse a relish which affects every body. It is observed that elegance, though irregular, is preferable to regularity without elegance; that is, by being too scrupulous of grammatical construction, we lose certain licenses wherein the elegance of language consists.

**ELEGIT**, in law, a writ of execution, which lies for a person who has recovered debt or damages; or upon a recognizance in any court, against a defendant that is not able to satisfy the same in his goods.

**ELEGY**, a mournful and plaintive kind of poem.

As elegy, at its first institution, was intended for tears, it expressed no other sentiments, it breathed no other accents but those of sorrow: with the negligence natural to affliction, it sought less to please than to move, and aimed at exciting pity, not admiration. By degrees, however, elegy degenerated from its original intention, and was employed upon all sorts of subjects, gay or sad, and especially upon love. Ovid's book of love, the poems of Tibullus and Propertius, notwithstanding they are termed elegies, are sometimes so far from being sad, that they are scarce serious. The chief subjects then to which elegy owes its rise, is death and love: that elegy therefore ought to be esteemed the most perfect in its kind which has somewhat of both at once; such, for instance, where the poet bewails the death of some youth or damsel falling a martyr to love.

**ELEMENT**, in physiology, a term used by philosophers to denote the original component parts of bodies, or those into which they are ultimately resolvable.

The elements or principles to which all bodies may be ultimately reduced, are these five: 1. Water, or phlegm, which, in the chymical analysis of them, rises first in form of vapour. 2. Air, which escapes unseen in great quantities from all bodies, so as to constitute half the substance of some of them. 3. Oil, which rises after, and appears swimming on the surface of the water. 4. Salt, which is either volatile, or rises in



the still, as that of animal substances, or fixed, as that of vegetables, which is obtained by reducing them to ashes, making a lixivium or lye of these, and afterwards evaporating the moisture, by which means the salt shoots into crystals. 5. Earth, or what is called the caput mortuum, being what remains of the ashes after the salt is extracted. This is the last element of all bodies, which can be no further altered by any art whatsoever.

ELEMENTS, also signify the foundations and principles of any art or science.

ELEMI, or ELEM, is a resin of Asiatick origin: the plant which produces it is not as yet known with certainty. There is also an inferior kind, brought from America, which is the only one now to be met with in the shops: the parent of this sort is called by Ray, *Arbor Brasiliensis gummi elemi simile fundens*, &c. a Brazilian tree, yielding a gum like elemi, with winged leaves, verticillate flowers, and a fruit about the size and shape of an olive. The true elemi comes over in large oblong masses or round leaves, generally wrapt up in leaves of the Indian reed. It is of a yellowish or rather greenish white colour; semitransparent; of a soft consistence, betwixt that of wax and turpentine, or dry on the outside and softish within: by age, it grows hard and brittle throughout. It has a moderately strong, not unpleasant smell, resembling that of a mixture of fennel, daucus, and smallage-seeds. It is commonly full of impurities, which are obvious enough to the eye.

This resin has hitherto been employed only in external applications; in nervine, vulnerary, and digestive plaisters and balsams. In making these kinds of compositions, we must be careful to avoid too great a degree of heat in mixing the ingredients; lest the essential oil, the most useful part of the elemi, be lost.

ELEPHANT, in zoology, the largest, strongest, and most docile animal, among terrestrial quadrupeds. The teeth of these animals are what we call ivory. See the article IVORY.

ELEPHANTIASIS, in medicine, one of the species of leprosy. See the article LEPROSY.

ELEVATION, the height or altitude of an object. See the article ALTITUDE.

ELEVATION of a *Mortar-piece*, or *Gun*, is the angle which the chace of the piece, or the axis of the hollow cylinder, makes with the plane of the horizon.

ELEVATION of the *Pole*, is the height or number of degrees that the pole, in any latitude, is raised or appears above the horizon. This is always equal to the latitude of the place.

ELEVATOR, in chirurgery, an instrument to elevate or raise bones, as in fractures of the skull, &c.

ELEVATOR *Labii inferioris*, in anatomy, is a muscle that arises from the second bone of the under jaw below the incisores. It descends and passes under the zygomaticus, and is inserted into the under lip. This, assisted by a small but strong pair of muscles, arising from the gums of the dentes incisivi, and descending directly, is inserted into the lower part of the skin of the chin; it pulls the skin of the chin upwards, and, consequently, thrusts up the lip.

ELEVATOR *Labii superioris*, is a muscle that arises from the upper part of the second bone of the upper jaw, and, descending obliquely, is inserted into the upper lip, above the dentes incisorii. It draws up the lip.

ELEVATOR *Oculi*, or *Musculus attollens*, or *superbus*, is the first of the four straight muscles that move the eye: it lies upon the upper part of the globe, and pulls up the eye when we look up.

ELEVE, a disciple or scholar.

ELEUSINIA, in antiquity, an ancient Grecian feast, observed in honour of Ceres; so called from Eleusis, the place where it was celebrated.

It was the most celebrated and mysterious solemnity of any in Greece; and so superstitiously careful were they to conceal its rites, that whoever divulged them was thought an impious person. Persons of both sexes were initiated at this solemnity; the neglect of which was so heinous, that it was one part of the accusation for which Socrates was put to death. The mysteries of the Eleusinia were divided into the greater and the less. At first people were to be purified, then admit-

ted to the less Eleusinia, and at last initiated into the greater. They were abolished in the reign of Theodosius the elder.

ELEUTHERIA, in antiquity, were festivals celebrated at Platea, in honour of Jupiter, surnamed Eleutherius, the assertor of liberty, on account of a victory obtained there by the Greeks over the Persians. They were held every five years, with races of armed chariots.

ELISION, in grammar, is the cutting off, or suppressing a vowel, at the end of a word, for the sake of sound or measure, the next word beginning with a vowel. Elisions are little known in English; in Latin, French, &c. they are frequent, and consist chiefly in suppressing the *a*, *e*, *i*, as in *Phyllida amo ante alias*, there are three elisions.

ELIXATION, in pharmacy, the extracting the virtues of ingredients by boiling or stewing.

ELIXIR, a compound tincture extracted from many efficacious ingredients. Hence the difference between a tincture and an elixir seems to consist in this, that a tincture is drawn from one ingredient, sometimes, with an addition of another to open it, and dispose it to yield to the menstruum; whereas an elixir is a tincture extracted from several ingredients at the same time.

ELIXIVATION, in chymistry, the operation whereby a fixed salt is extracted from the ashes of vegetables, by an affusion of water.

ELK, *Alce*, in zoology, an animal of the deer kind, with the horns palmated, and without a stem. It is a native of the northern parts of Europe, and is a very large and strong animal; being equal in size to a horse, but much less beautiful.

Elk's hoofs stand recommended for the cure of the epilepsy, but at present are only used as an ingredient in some old compositions.

ELL, *Ulna*; a measure of length, different in different countries; but those mostly used in England, are the English and Flemish ells; whereof the former is three feet nine inches, or one yard and a quarter; and the latter only 27 inches, or three quarters of a yard. In Scotland, the ell contains  $37\frac{2}{3}$  English inches. See the article MEASURE.

ELLIPSIS, in geometry, a curve line returning into itself, and produced from the section of a cone by a plane cutting both its sides, but not parallel to the base. See CONICK SECTIONS.

The easiest way of describing this curve, in plano, when the transverse and conjugate axes *AB*, *ED*, (*plate XXXI. fig. 4.*) are given, is thus: First, take the points *F*, *f*, in the transverse axis *AB*, so that the distances, *CF*, *Cf*, from the centre *C*, be each equal to  $\sqrt{AC^2 - CD^2}$ ; or that the lines *FD*, *fD*, be equal to *AC*. Then, having fixed two pins in the points *F*, *f*, which are called the foci of the ellipsis, take a thread equal in length to the transverse axis *AB*; and fastening its two ends, one to the pin *F*, and the other to *f*, with another pin *M* stretch the thread tight: then if this pin *M* be moved round till it returns to the place from whence it first set out, keeping the thread always extended so as to form the triangle *FMf*, it will describe an ellipsis, whose axes are *AB*, *DE*.

The greater axis, *AB*, passing through the two foci *Ff*, is called the transverse axis; and the less one *DE*, is called the conjugate, or second axis: these two always bisect each other at right angles, and the centre of the ellipsis is the point *C*, where they intersect. Any right-line passing through the centre, and terminated by the curve of the ellipsis on each side, is called a diameter; and two diameters, which naturally bisect all the parallels to each other, bounded by the ellipsis, are called conjugate diameters. Any right-line, not passing thro' the centre, but terminated by the ellipsis, and bisected by a diameter, is called the ordinate, or ordinate applicable to that diameter. And a third proportional to two conjugate diameters, is called the latus rectum, or parameter of that diameter, which is the first of the three proportionals.

The reason of the name is this: let *BA*, *ED*, be any two conjugate diameters of an ellipsis (*fig. 5.* where they are the two axes) at the end *A*, of the diameter *AB*, raise the perpendicular *AF*, equal to the latus rectum,



rectum, or parameter, being a third proportional to  $AB$ ,  $ED$ , and draw the right line  $BF$ : then if any point  $P$  be taken in  $BA$ , and an ordinate  $PM$  be drawn, cutting  $BF$  in  $N$ , the rectangle under the absciss  $AP$ , and the line  $PN$  will be equal to the square of the ordinate  $PM$ . Hence drawing  $NO$  parallel to  $AB$ , it appears that this rectangle, or the square of the ordinate, is less than that under the absciss  $AP$ , and the parameter  $AF$ , by the rectangle under  $AP$  and  $OF$ , or  $NO$  and  $OF$ ; on account of which deficiency, Apollonius first gave this curve the name of an ellipsis.

In every ellipsis, as  $AEBD$  (*fig. 5.*) the squares of the semi-ordinates  $MP$ ,  $mp$ , are as the rectangles under the segments of the transverse axis  $AP \times PB$ ,  $Ap \times pB$ , made by these ordinates respectively; which holds equally true of the circle, where the figures of the ordinates are equal to such rectangles, as being mean proportionals between the segments of the diameter. In the same manner, the ordinates to any diameter whatever are as the rectangles under the segments of that diameter.

As to the other principal properties of the ellipsis, they may be reduced to the following propositions: 1. If from any point  $M$  in an ellipsis, two right-lines,  $MF$ ,  $Mf$ , (*fig. 4.*) be drawn to the foci  $Ff$ , the sum of these two lines will be equal to the transverse axis  $AB$ . This is evident from the manner of describing an ellipsis. 2. The square of half the less axis is equal to the rectangle under the segments of the greater axis, contained between the foci and its vertices; that is,  $DC^2 = AF \times FB = Af \times fB$ . 3. Every diameter is bisected in the centre  $C$ . 4. The transverse axis is the greatest, and the conjugate axis the least, of all diameters. 5. Two diameters, one of which is parallel to the tangent in the vertex of the other, are conjugate diameters; and vice versa, a right line drawn through the vertex of any diameter parallel to its conjugate diameter, touches the ellipsis in that vertex. 6. If four tangents be drawn through the vertices of two conjugate diameters, the parallelogram contained under them will be equal to the parallelogram contained under tangents drawn through the vertices of any other two conjugate diameters. 7. If a right line, touching an ellipsis, meet two conjugate diameters produced, the rectangle under the segments of the tangent, between the point of contact and these diameters, will be equal to the square of the semi-diameter, which is conjugate to that passing through the point of contact. 8. In every ellipsis the sum of the squares of any two conjugate diameters, is equal to the sum of the squares of the two axes. 9. In every ellipsis, the angles  $FGI$ ,  $fGH$ , made by the tangent  $HI$ , and the lines  $FG$ ,  $fG$ , drawn the foci to the point of contact, are equal to each other. 10. The area of an ellipsis is to the area of a circumscribed circle, as the less axis is to the greater; and vice versa, with respect to an inscribed circle; so that it is a mean proportional between two circles, having the transverse and conjugate axes for their diameters. This holds equally true of all the other corresponding parts belonging to an ellipsis.

ELLIPSIS, in grammar, a figure of syntax, wherein one or more words are not expressed; and from this deficiency it has got the name ellipsis.

To this figure, besides the ellipsis properly so called, belong apposition, synecdoche, asyndeton, zeugma, syllepsis and prolepsis.

The ellipsis, properly so called, is when the deficient word or words must be supplied from elsewhere; as, *Hectoris Andromache*, where *uxor* is understood; that is, *Andromache*, *Hector's wife*.

ELLIPSIS, in rhetoric, a figure nearly allied to preterition, when the orator, through transport of passion, passes over many things, which, had he been cool, ought to have been mentioned.

In preterition, the omission is designed, which, in the ellipsis, is owing to the vehemence of the speaker's passion, and his tongue not being able to keep pace with the emotion of his mind.

ELLIPTICK, or ELLIPTICAL, something belonging to an ellipsis. Thus we meet with elliptick compasses, elliptick conoid, elliptick space, elliptick stairs, &c.

ELM, *Ulmus*, in botany, the name of a tree, too common to need any description here; and of which there are several species, as the broad-leaved elm, or witch-hazel; the smooth-leaved or witch-elm, and several varieties with variegated leaves, observed by the curious in plants. All these delight in the same soil, which should be a good loam, to have them in the greatest perfection; though they will flourish in other soils.

These trees are increased by layers or suckers: The layers are to be preferred, as they generally arise with a better root; for if they are not well rooted when planted, they make very little progress in their growth, and frequently fail, notwithstanding, to appearance, they may have made tolerable shoots for the first two or three years; therefore we would advise those who plant elms to observe they are well rooted, as otherwise they may be deceived in their expectations.

Elms were formerly, when clipping was more in fashion than at present, much in use for hedges, and no plants are more proper, where it is required to break the violence of the winds; but they should not be planted too near walls where fruit-trees are placed against, as they will by the extension of their roots, which spread to a greater distance than is commonly imagined, deprive the other plants of the nourishment requisite for their welfare. In the park, elms are delightful, being planted in avenues, where their noble shade and verdure demonstrates their grandeur; an example of which may be seen in Greenwich-park, whose delightful walks, so much resorted to, are chiefly adorned with these beautiful and advantageous trees.

In planting elms, it is necessary to observe, that they should not be planted too deep, particularly in loamy or clayey lands; in which latter case it is not amiss to plant them on a little hill, when there will be the less danger of their rotting in winter; and likewise, if they are designed for timber, not to top the extreme part of the plant, as it impedes their growth, and occasions their decaying soon.

With regard to their medicinal virtues, the leaves are astringent; and the bark good for assuaging the pains of the gout, by a decoction of it reduced to the consistence of a syrup, and a third part of brandy added, and used as a linament. It also makes a good gargarism for sore mouths, when occasioned by heat and sharpness of humours.

ELOCUTION, in rhetoric, the adapting words and sentences to the things or sentiments to be expressed. It consists in elegance, composition, and dignity. The first, comprehending the purity and perspicuity of a language, is the foundation of elocution. The second ranges the words in proper order; and the last adds the ornaments of tropes and figures to give strength and dignity to the whole. See the article *STYLE*, *PERIOD*, *FIGURE*, &c.

ELOGY, *Elogium*, a praise or panegyrick bestowed on any person or thing, in consideration of its merit. The beauty of elogy consists in an expressive brevity. Elogiums should not have so much as one epithet properly so called, nor two words synonymous. They should strictly adhere to truth; for extravagant and improbable elogies rather lessen the character of the person or thing they would extol.

ELONGATION, in astronomy, is the removal of a planet to the furthest distance it can be from the sun, as it appears to an eye placed on the earth.

The word is Latin, from *elongo*, to be distant from. The utmost elongation of Venus can be but 45 degrees, and that of Mercury but 30 degrees; which is the reason this planet is so rarely seen.

ELONGATION, is also used for the difference in motion between the swiftest and the slowest of two planets, or the quantity of space whereby the one has overgone the other.

Angle of ELONGATION, is an angle contained under lines drawn from the centre of the sun and planet to the centre of the earth.

ELONGATION, in surgery, is an imperfect luxation occasioned by the stretching or lengthening of the ligaments of any joint.



**ELOPEMENT**, in law, is where a married woman departs from her husband, and cohabits with an adulterer; in which case the husband is not obliged to allow her any alimony out of his estate, nor is he chargeable for necessaries for her of any kind.

**ELOQUENCE**, the art of speaking with copiousness and embellishment.

**ELUL**, in ancient chronology, the 12th month of the Jewish civil year, and the sixth of the ecclesiastical. It consisted of 29 days, and answered nearly to our August.

**ELYSIUM**, or **ELYSIAN FIELDS**, in the heathen mythology, certain plains abounding with woods, fountains, verdure, and every delightful object; supposed to be the habitation of heroes and good men after death.

**EMANCIPATION**, in the Roman law, the setting free a son from the subjection of his father; so that whatever moveables he acquires, belong in propriety to him, and not to his father, as before emancipation.

**EMARGINATED**, among botanists, an appellation given to such leaves as have a little indenting on their summits: when this indenting is terminated on each side by obtuse points, they are said to be obtusely emarginated; whereas, when these points are acute, they are called acutely emarginated.

**EMAUX DE L'ESCU**, in heraldry, the metal and colour of the shield or escutcheon.

**EMBALMING**, is the opening a dead body, taking out the intestines, and filling the place with odoriferous and desiccative drugs and spices, to prevent its putrifying.

**EMBARGO**, in commerce, an arrest on ships or merchandize, by publick authority; or a prohibition of state, commonly on foreign ships, in time of war, to prevent their going out of port; sometimes to prevent their coming in; and sometimes both, for a limited time.

**EMBASSADOR**, or **AMBASSADOR**. See **AMBASSADOR**.

**EMBASSY**, the office or function of an ambassador.

**EMBER-WEEKS**, or **DAYS**, in the Christian church, are certain seasons of the year set apart for imploring God's blessing, by prayer and fasting, upon the ordinations performed in the church at such times. These ordination-fasts are observed four times in the year, viz. the Wednesday, Friday and Saturday after the first Sunday in Lent, after Whit-Sunday, after the 14th of September, and the 13th of December; it being enjoined, by a canon of the church, that deacons and ministers be ordained, or made, only upon the Sundays immediately following these ember-fasts.

**EMBLEM** is a kind of painted ænigma, or certain figures delineated or cut metaphorically, expressing some action, with reflections underneath, which in some measure explain the sense of the device, and at the same time instruct us in some moral truth, or other matter of knowledge.

**EMBLIMENTS**, among lawyers, denote the profits of fown lands; but are sometimes used, more largely, for any products that naturally arise from the ground.

**EMBOLISMICK**, intercalary, or belonging to the embolismus.

**EMBOLISMUS**, the excess of the solar year above the lunar, whereby the lunations happen every subsequent year 11 days sooner than in the preceding; which, when they amount to 30 days, make a new month, called the embolismick lunation, or embolismick month; which being added to the lunar year, it becomes equal to the solar.

**EMBOLUS**, the moveable part of a pump or syringe, called also the piston or sucker.

**EMBRASURE**, in architecture, the enlargement made of the aperture of a door or window on the inside of a wall; its use being to give the greater play for the opening of the door or casement, or to admit the more light. When the wall is very thick, they sometimes make embrasures on the outside.

**EMBRASURE**, in fortification, a hole or aperture in a parapet, through which the cannon are pointed to fire into the moat or field.

Embrasures are generally twelve feet distant from one

another, every one of them being from six to seven feet wide without, and about three within: their height above the platform is three feet on that side towards the town, and a foot and a half on the other side towards the field; so that the muzzle may be sunk on occasion, and the piece brought to shoot low.

**EMBROCATION**, in surgery and pharmacy, an external kind of remedy, which consists in an imigation of the part affected, with some proper liquor, as oils, spirits, &c. by means of a woollen or linen cloth, or a sponge, dipped in the same.

**EMBROIDERY**, a work in gold, or silver, or silk thread, wrought by the needle upon cloth, stuffs, or muslin, into various figures. In embroidering stuffs, the work is performed in a kind of loom, because the more the piece is stretched, the easier it is worked.

**EMERYO**, in physiology, the first rudiments of an animal in the womb, before the several members are distinctly formed; after which period it is denominated a foetus.

**EMERALD**, *smaragdus*, in natural history, a genus of precious stones, of a green colour, and next in hardness of the ruby.

Our jewellers distinguish emeralds into two kinds, the oriental and occidental: the emeralds of the E. Indies are evidently finer than those of any other part of the world; but our jewellers, seldom meeting with these, call the American emeralds the oriental, and usually sell crystal accidentally tinged with green, under the name of the occidental emerald: these being also the most common, there has grown an opinion among the lapidaries, that the emerald is no harder than the crystal; because what they take to be emeralds, are in general only crystals.

The genuine emerald, in its most perfect state, is perhaps, the most beautiful of all the gems: it is found of various sizes, but usually small; a great number of them are met with of about the 16th part of an inch in diameter, and they are found from this to the size of a walnut. We have accounts of very large sizes among the ancients, but they are certainly erroneous, the stones not being emeralds, but jaspers or other green stones: the larger specimens are at present very scarce, and are of considerable value, though much more so, when of the E. or W. Indies. The emerald is of different figures like the diamond and many of the other gems, being sometimes found in a roundish or pebble-like form, but much more frequently in a columnar one, resembling common crystal; the pebble-emeralds are always the hardest and brightest, but are seldom found exceeding the size of a pea: the crystalliform ones grow several together, and are often larger: the pebble-kind are found loose in the earths of mountains, and sands of rivers; the columnar are found usually bedded in, or adhering to, a white, opaque, and coarse crystalline mass, and sometimes to the jasper, or the prasius.

The oriental emerald is of the hardness of the sapphire and ruby, and is second only to the diamond in lustre and brightness: the American is of the hardness of the garnet, and the European somewhat softer than that, yet considerably harder than crystal: but the coloured crystals, usually sold under the name of emeralds, has much debased the credit of this gem. It loses its colour in the fire, and becomes undistinguishable from the white sapphire.

The oriental emeralds are very scarce, and at present found only in the kingdom of Cambay; very few of them have of late been imported into Europe, inasmuch that it has been supposed there were no oriental emeralds; but within these 10 years, some few have been brought from Cambay into Italy, that greatly excel the American ones. The American, being what our jewellers call oriental emeralds, are found principally about Peru; and the European, are principally from Silesia.

The medicinal virtues ascribed to this stone, are, that it stops hæmorrhages and diarrhœas, and sweetens or obtunds the too acid humours.

*To counterfeit EMERALDS.* Take of natural crystal, four ounces; of red-lead, four ounces; verdigrease, 48 grains; crocus martis, prepared with vinegar, eight grains; let the whole be finely pulverized and sifted;

put



put this into a crucible, leaving one inch empty; lute it well, and put it into a potter's furnace; and let it stand there as long as they do their pots. When cold, break the crucible, and you will find a matter of a fine emerald-colour, which, after it is cut and set in gold, will surpass in beauty an oriental emerald.

**EMERGENT YEAR**, in chronology, the same with the epocha, whence any æra, or method of reckoning time, commences: such is that of the creation of the world, of the birth of our Saviour, &c.

**EMERSION**, in astronomy, is when any planet that is eclipsed begins to emerge or get out of the shadow of the eclipsing body. It is also used when a star, before hid by the sun as being too near him, begins to re-appear or emerge out of his rays.

*Scruples of EMERSION*, an arch of the moon's orbit, which the moon's centre passes over from the time she begins to emerge out of the shadow of the earth to the end of the eclipse.

**EMERUS**, in botany, &c. the same with coronilla.

**EMERY**, in natural history, a rich-iron-ore found in large masses of no determinate shape or size, extremely hard, and very heavy. It is usually of a dusky brownish-red on the surface, but when broken, is of a fine, bright, iron-grey, but not without some tinge of redness, and is spangled all over with shining specks, which are small flakes of a foliaceous talck, highly impregnated with iron. It is also sometimes very red, and then usually contains veins of gold. It makes no effervescence with any of the acid menstruums, and is found in the island of Guernsey, in Tuscany, and many parts of Germany.

Emery is said to have a corroding and almost caustick quality, but this without any just foundation. It is recommended by the ancients as an astringent and dentifrice. In this last intention, however, it must be used with great caution, as its hardness and sharpness will be apt to wear off the enamel of the teeth.

Emery is prepared by grinding in mills, and the powder is separated into parcels of different degrees of fineness by washing; these are called the first, second, and third sort; the first being that which remains longest suspended in water, the others, such as sink sooner from the same liquor, and from which it is poured, while yet turbid, to settle for the finer kind. These several sorts are of great use to various artificers in polishing and burnishing iron and steel works, marble, cutting and scolloping glass, &c. The lapidaries cut the ordinary gems on their wheels, by sprinkling the wetted powder over them, the wheels they use being usually of lead, with a small admixture of pewter, that their softness may admit the emery the better. It will not cut diamonds.

The red emery of Peru is in great esteem with those who seek after the philosopher's stone: for the king of Spain will not suffer any of it to be exported.

*Putty of EMERY*, a kind of dirty matter found on lapidaries wheels, containing part of the powder of emery.

**EMETICKS**, in physick, medicines that provoke vomiting.

**EMIR**, an Arabick title, signifying a prince.

**EMMENAGOGUES**, in pharmacy, medicines which promote the menses or monthly courses.

**EMOLLIENTS** are such medicines as sheathe and soften the asperities of the humours, and relax and supple the solids at the same time.

The word is derived from the Latin *emollio*, to soften.

Their effects may be thus accounted for; by what means soever the juices in the human body have obtained any sharp, so as to vellicate the fibres and nervous parts, as is often the case; those things which are smooth, soft, and yielding, cannot but wrap up the points and render them imperceptible; whereby they may be gradually, by the course of circulation, brought to some proper emunctory, without doing any injury by the way. Such sharp particles likewise draw the fibres into spasms, keep them too tense, and frequently occasion thereby obstructions of the worst kind. In all such cases, therefore, emollients lubricate and moisten the fibres, so as to relax them into their proper dimensions; whereby such disorders cease. *Quincy.*

VOL. I. No. 28.

**EMPALEMENT**, an ancient kind of punishment, which consisted in thrusting a stake up the fundament.

**EMPALEMENT of the Flower**, among herbalists, the same with calyx. See the article **CALYX**.

**EMPANELLING**, or **IMPANELLING**, in law, signifies the entering or writing the names of the jury into a parchment schedule, or roll of paper, by the sheriff, which he hath summoned to appear for the performance of such publick services as are allotted to juries.

**EMPERESS**, or **EMPRESS**, the consort of an emperor, or a woman who governs an empire in her own person.

**EMPEROR**, *Imperator*, a title of honour among the ancient Romans, conferred on a general who had been victorious, and now made to signify a sovereign prince, or supreme ruler of an empire.

**EMPHASIS**, in rhetoric, a particular stress of the voice and action, laid on such parts or words of the oration as the orator wants to enforce upon his audience.

**EMPHERETPYRA**, in mineralogy, a genus of siderochita, composed of various coats surrounding a nucleus of the same substance and structure with themselves.

Of this genus there are several species, distinguished by the different colours of their coats or crusts, as brown, yellow, purple, green white, &c.

**EMPHRACTICKS**, in medicine and pharmacy, obstructing topicks, such as, when applied to the body, adhere and stop the pores.

**EMPHYSEMA**, in surgery, a windy tumour generally occasioned in a fracture of the ribs, and formed by the air insinuating itself, by a small wound, between the skin and the muscles, into the substance of the cellular or adipose membrane, spreading itself afterwards up to the neck, head, belly, and other parts, much after the manner in which butchers blow up their veal.

**EMPIRE**, a large extent of country, under the jurisdiction or government of an emperor.

**EMPIRICK**, an appellation given to those physicians who conduct themselves entirely by their own experience, without studying physick in a regular method. It is sometimes used to signify a quack, or one that prescribes at random, without any knowledge of the healing art.

**EMPLASTER**, *Emplastrum*, in pharmacy, the same with plaster. See the article **PLASTER**.

**EMPYEMA**, in physick, implies, in a general sense, a collection of purulent matter in any part of the body, but is generally applied to such a collection to the cavity of the thorax only.

**EMPYREUM**, a term used by divines for the highest heaven, where the blessed enjoy the beatifick vision.

**EMPYREUMA**, among chymists and physicians, the fiery taste or offensive smell which brandies and other bodies prepared by fire are impregnated with.

**EMRODS**, or **HÆMORRHOIDS**. See the article **HÆMORRHOIDS**.

**EMULGENT**, or **RENAL ARTERIES**, those which supply the kidneys with blood; being sometimes single, sometimes double on each side. See **ARTERY**.

**EMULSION**, in pharmacy, properly signifies medicines which resemble milk. Thus solutions of gums, resins, or spermaceti, made by means of the yolk of an egg, in a proper vehicle, are called emulsions.

**EMUNCTORY**, in anatomy, a general term for all those parts which serve to carry off the excrementitious parts of the blood and humours of the body. Such more especially are the kidneys, bladder, and most of the glands.

**EMUSCATION**, in gardening and husbandry, implies the clearing trees from moss, &c.

**ENÆMON**, in medicine, an epithet often applied by Hippocrates and Galen, to such topical medicines as are appropriated to a wound newly inflicted, before the blood be stopped.

**ENÆOREMA**, in medicine, thatp endulous substance which floats in the urine. It is also called sublimamentum, and nubeculæ, from its resemblance to little clouds.

**ENALLAGE**, in grammar, is when a possessive pronoun is put for a relative, or one mood or tense of a verb is put for another, &c.



**ENALLAGE**, in rhetoric, is a figure whereby the discourse is changed and reversed, contrary to all the rules of the language; but this is not done altogether at pleasure, or without reason.

**ENALURON**, according to Guillim, is a border charged all round with birds; though others will have it to signify, in orle, or form of a border.

**ENAMEL**, a kind of coloured glass, used in enamelling and painting in enamel.

Enamels have for their basis a pure crystal-glass or frit, ground up with a fine calx of lead and tin prepared for the purpose, with the addition usually of white salt of tartar. These ingredients baked together, are the matter of all enamels, which are made by adding colours of this or that kind in powder to this matter, and melting or incorporating them together in a furnace.

For white enamel, Neri De Arte Vitriar, directs only manganese to be added to the matter with constitutes the basis. For azure, zaffer mixed with calx of brass. For green, calx of brass with scales of iron, or with crocus martis. For black, zaffer with manganese or with crocus martis; or manganese with tartar. For red, manganese or calx of copper and red tartar. For purple, manganese with calx of brass. For yellow, tartar and manganese. And for violet-coloured enamel, manganese with thrice calcined brass.

In making these enamels, the following general cautions are necessary to be observed: 1. That the pots must be glazed with white glass, and must be such as will bear the fire. 2. That the matter of enamels must be very nicely mixed with the colours. 3. When the enamel is good, and the colour well incorporated, it must be taken from the fire with a pair of tongs. 4. The general way of making the coloured enamels is this: powder, sift, and grind all the colours very nicely, and first mix them with one another, and then with the common matter of enamels; then set them in pots in a furnace, and when they are well mixed and incorporated, cast them into water; and when dry, set them in a furnace again to melt; and when melted, take a proof of it. If too deep-coloured, add more of the common matter of enamels; and if too pale, add more of the colours.

Enamels are used either in counterfeiting or imitating precious stones, in painting in enamel, or by enamellers, jewellers, and goldsmiths, in gold, silver, and other metals. The two first kinds are usually prepared by the workmen themselves, who are employed in these arts. That used by jewellers, &c. is brought to us chiefly from Venice or Holland, in little cakes of different sizes, commonly about four inches diameter, having the mark of the master struck upon it.

**ENAMELLING**, the art of laying enamel upon metals, as gold, silver, copper, &c. and of melting it at the fire, or of making divers curious works in it at a lamp. It signifies also to paint in enamel.

*The method of painting in enamel.* This is performed on plates of gold or silver, and most commonly of copper, enamelled with the white enamel; whereon they paint with colours which are melted in the fire, where they take a brightness and lustre like that of glass. This painting is the most prized of all for its peculiar brightness and vivacity, which is very permanent, the force of its colours not being effaced or sullied with time, as in other painting, and continuing always as fresh as when it came out of the workman's hands. It is usual in miniature, it being the more difficult the larger it is, by reason of certain accidents it is liable to in the operation. Enamelling should only be practised on plates of gold, the other metals being less pure: copper, for instance, scales with the application, and yields fumes; and silver turns the yellows white. Nor must the plate be made flat; for in such case, the enamel cracks; to avoid which, they usually forge them a little round or oval, and not too thick. The plate being well and evenly forged, they usually begin the operation by laying on a couch of white enamel (as we observed above) on both sides, which prevents the metal from swelling and blistering; and this first lay, serves for the ground of all the other colours. The plate being thus prepared, they begin at first by drawing out exactly the subject to be painted with red vitriol, mixed with oil of spike, marking all parts of the design very lightly with a small pencil. After this, the colours

(which are to be before ground with water in a mortar of agate extremely fine, and mixed with oil of spike somewhat thick) are to be laid on, observing the mixtures and colours that agree to the different parts of the subject; for which it is necessary to understand painting in miniature. But here the workman must be very cautious of the good or bad qualities of the oil of spike he employs to mix his colours with, for it is very subject to adulterations.

Great care must likewise be taken, that the least dust, imaginable come not to your colours while you are either painting or grinding them; for the least speck, when it is worked up with it, and when the work comes to be put into the reverberatory to be red hot, will leave a hole, and so deface the work.

When the colours are all laid, the painting must be gently dried over a slow fire to evaporate the oil, and the colours afterwards melted to incorporate them with the enamel, making the plate red hot in a fire, like what the enamellers use. Afterwards that part of the painting must be passed over again which the fire hath any thing effaced, strengthening the shades and colours, and committing it again to the fire, observing the same method as before, which is to be repeated till the work is finished.

**ENAMELLING by the lamp.** Most enamelled works are wrought at the fire of a lamp, in which, instead of oil, they put melted horse-grease, which they call caballine oil. The lamp, which is of copper or white iron, consists of two pieces, in one of which is a kind of oval plate, six inches long, and two high, in which they put the oil and the cotton. The other part, called the box, in which the lamp is inclosed, serves only to receive the oil which boils over by the force of the fire. This lamp, or where several artists work together, two or three more lamps are placed on a table of proper height. Under the table, about the middle of its height, is a double pair of organ-bellows, which one of the workmen moves up and down with his foot, to quicken the flame of the lamps, which are by this means excited to an incredible degree of vehemence. Grooves made with a gauge in the upper part of the table, and covered with parchment, convey the wind of the bellows to a pipe of glass before each lamp; and that the enamellers may not be incommoded with the heat of the lamp, every pipe is covered at six inches distance with a little tin plate, fixed into the table by a wooden handle. When the works do not require a long blast, they only use a glass-pipe, into which they blow with their mouth.

It is incredible to what a degree of fineness and delicacy the threads of enamel may be drawn at the lamp. Those which are used in making false tufts of feathers are so fine, that they may be wound on the reel like silk or thread. The fictitious jets of all colours, used in embroideries, are also made of enamel; and that with so much art, that every small piece hath its hole to pass the thread through wherewith it is sewed. These holes are made by blowing them into long pieces, which they afterwards cut with a proper tool.

It is seldom that the Venetian or Dutch enamels are used alone; they commonly melt them in an iron-ladle, with an equal part of glass or crystal; and when the two matters are in perfect fusion, they draw it out into threads of different sizes, according to the nature of the work. They take it out of the ladle while liquid, with two pieces of broken tobacco-pipes, which they extend from each other at arm's length. If the thread is required still longer, then another workman holds one end, and continues to draw it out, while the first holds the enamel to the flame. Those threads, when cold, are cut into what lengths the workman thinks fit, but commonly from 10 to 12 inches; and as they are all round, if they are required to be flat, they must be drawn through a pair of pincers while yet hot. They have also another iron-instrument in form of pincers, to draw out the enamel by the lamp when it is to be worked or disposed in figures. Lastly, they have glass-tubes of various sizes, serving to blow the enamel into various figures, and preserve the necessary vacancies therein; as also to spare the stuff and form the contours. When the enameller is at work, he sits before his foot then on the step that moves on the bellows, and holding in



in his left hand the work to be enamelled, or the brass or iron-wires the figures are to be formed on, he directs with his right the enamel thread, which he holds to the flame with a management and patience equally surprising. There are few things they cannot make or represent with enamel; and some figures are as well finished, as if done by the most skilful carvers. See *PAINTING in Enamel*.

**ENARTHROSIS**, in anatomy, the same with arthrosis, or an articulation wherein the round end of one bone moves in the cavity of another, more or less proportionable to it, as the head of the os femoris in the acetabulum of the os innominatum, and as the radius receives the humerus.

**ENCANTHIS**, in surgery, is a certain tubercle that arises in the angle of the eye, either from the caruncula lachrymalis, or from the crescent like a red cuticle adjacent thereto. Sometimes this swelling is so big, as not only to cover the puncta lachrymalia, but also the greatest part of the pupil; in this case tears continually trickle down the cheeks, the sight is impaired, and the eyes are inflamed.

There are two kinds of this disorder; the more mild of which is not accompanied with hardness or pain; whereas that which is more obstinate, is accompanied with pain, is livid, and sometimes partakes of the nature of a cancer.

**ENCAUSTICE**, or **ENCASTUM**, the same with enamelling and enamel. See *ENAMELLING* and *ENAMEL*.

**ENCEINTE**, in fortification, implies the wall or rampart which surrounds a place.

**ENCEPHALI**, in medicine, worms generated in the head, where they cause so great a pain, as sometimes to occasion distraction.

The encephali are very rare, but there are some diseases wherein they swarm; from whence we are told pestilential fevers have wholly arisen. Upon the dissection of one who died of this fever, a little, short, red worm was found in the head, which Malmsey wine, wherein horse radish had been boiled, could only destroy. This medicine was afterwards tried on the sick, most of whom it cured.

The like worms have also been taken out by trepanning, and the patient cured. Those worms that generate in the nose, ears, and teeth, are also called encephali.

**ENCEPPE**, in heraldry, denotes fettered, chained, or girt about the middle, as is usual with monkeys.

**ENCHANTER**, a person supposed to practise enchantment, or fascination.

**ENCHASING**, **INCHASING**, or **CHASING**, the art of enriching and beautifying gold, silver, and other metal-work, by some design, or figures represented thereon, in low relieve.

**ENCHYSMA**, in medicine, the same with clyster. See *CLYSTER*.

**ENCLITICA**, in grammar, particles which are so closely united with other words, as to seem part of them, as in *virumque*, &c.

There are three enclitick particles in Latin, viz. *que*, *ne*, *ve*; but there are a great many in the Greek, as *τε*, *μη*, *τοι*, *ος*, *οι*, &c.

**ENCRATITES**, *Encratitæ*, in church history, heretics who appeared towards the end of the second century: they were called Encratites, or Continentes, because they gloried in abstaining from marriage, and the use of wine and animal food. Their chastity, however, was a little suspected, on account of their using all sorts of means to draw women into their sect, and always keeping company with them.

**ENCROACHMENT**, an unlawful gathering in upon another man, or an advance into the territories or rights of another.

**ENCYCLOPÆDIA**, the circle of arts and sciences.

**ENDECAGON**, in geometry, the same with hendecagon. See the article *HENDECAGON*.

**ENDEMICK**, or **ENDEMICAL DISEASES**, those to which the inhabitants of particular countries are subject more than others, on account of the air, water, situation, and manner of living.

It has been always observed, that the inhabitants of different countries, were peculiarly subject to particular

diseases, owing either to their way of living, or the earth, and effluvia of the earth and water. The famous Hoffman has made many curious observations on diseases of this kind: he observes that the Laplanders have often distempers of the eyes, owing to their living generally in smoke, or being blinded with the snow; that pleurifies and inflammation of the lungs are also very frequent among them, and that the small-pox often rages there with great violence: he observes also, that swellings of the throat have always been common to the inhabitants of mountainous countries; and the old Roman authors say, Who wonders at a swelled throat in the Alps? The people of Carinthia, Styria, Tyrol, the Hartz-forest, Transylvania, and the inhabitants of Cronstad, he observes, are all subject to this disease, from the same cause: and it seems that these strumous swellings are owing to the water which they drink, and which, in mountainous places, is usually very much impregnated with sparry or stony particles.

The French are peculiarly troubled with fevers, with worms, and with hydroceles, and sarcocoles; and all these disorders seem to be owing originally to their eating very large quantities of chestnuts. The people of our nation are peculiarly afflicted with hoarsenesses, catarrhs, coughs, dysenteries, and consumptions; the women with the fluor albus, or whites; and the children with a disease scarce known else where, which we call the rickets. In different parts of Italy, different diseases reign: at Naples the venereal disease is more common than in any other part of the world: at Venice, people are peculiarly subject to the bleeding piles. At Rome, tertian agues and lethargic distempers are most known: in Tuscany, the epilepsy: in Apulia, burning fevers, pleurifies, and that sort of madness which is attributed to the bite of the tarantula, and which, it is said, is only cured by music. In Spain, apoplexies are common, as also melancholy, hypochondriacal complaints, and bleeding piles. The Dutch are peculiarly subject to the scurvy, and the stone in the kidneys. Denmark, Sweden, Pomerania, and Livonia are all terribly afflicted with the scurvy. The Russians and Tartars are afflicted with ulcers made by the cold, of the same nature with what we call chilblains: and in Poland and Lithuania there reigns a peculiar disease, called the plica Polonica, so terribly painful and offensive, that scarce any thing can be worse. The people of Hungary are very subject to the gout and rheumatism; they are more infested with lice and fleas than any other people in the world; and they have a peculiar disease, which they call cremor. The Germans, in different parts of the empire, are subject to different reigning diseases: in Westphalia they have the peripneumonies and the itch: in Silesia, Franconia, Austria, &c. they are subject to fevers of the burning kind, to hæmorrhages, to the gout, inflammations, and consumptions. In Constantinople the plague always rages. And in the W. Indian islands, malignant fevers, and the most terrible colicks are frequent.

**ENDIVE**, in botany, a plant much used as a fallad in winter with us, of which there are great varieties; but the sort which is most cultivated here is the curled leaved endive.

For the generical characters and medicinal virtues of endive; see *CICHORIUM*, of which it is a species.

**ENDLESS**, something without an end: thus authors mention endless rolls, the endless screw, &c. See the articles *ROLL* and *SCREW*.

**ENDORSE**, in heraldry, an ordinary, containing the eighth part of a pale, which Leigh says is only used when a pale is between two of them.

**ENDORSED**, *Endorsé*, in heraldry, is said of things borne back to back, more usually called *adossé*. See the article *ADOSSE*.

**ENDORSEMENT**, or **INDORSEMENT**, in law. See the article *INDORSEMENT*.

**ENDOWMENT**, in law, denotes the settling a dower on a woman; though sometimes it is used figuratively, for settling a provision upon a parson, or the building of a church; or the severing a sufficient portion of tithes for a vicar, when the benefice is appropriated.



ENEMA, in medicine, the same with clyster. See the article *CLYSTER*.

ENEMY, in law, an alien or foreigner, who publickly invades the kingdom. Whether enemies come into the realm by themselves, or in company with English traitors, they are only dealt with according to the martial law, and not punished as traitors: yet where a subject of a foreign nation, who lives here under the king's protection, takes up arms against the government, he shall be punished as a traitor.

ENERGUMENS, in church-history, persons supposed to be possessed by the devil, concerning whom there were many regulations among the primitive Christians. They were denied baptism, and the eucharist; at least, this was the practice of some churches: and though they were under the care of exorcists, yet it was thought a becoming act of charity to let them have the publick prayers of the church, at which they were permitted to be present.

ENERGY, *ενεργεια*, a term of Greek origin, signifying the power, virtue, or efficacy of a thing. It is also used figuratively, to denote emphasis of speech.

ENFILADE, in the art of war, is used in speaking of trenches, or other places, which may be scoured by the enemy's shot, along their whole length. In conducting the approaches at a siege, care must be taken that the trenches be not enfiladed from any work of the place.

ENFRANCHISEMENT, in law, the incorporating a person into any society or body politick: thus, where any person is enfranchised, or made free of any city, borough, or company, he is said to have a freehold therein during life; and cannot, for barely endeavouring any thing against the corporation, forfeit the same. Naturalization is also another kind of enfranchisement.

ENGASTRIMYTHI, in pagan theology, the pythians, or priestesses of Apollo, who delivered oracles from within, without any action of the mouth or lips. See the article *PYTHIA*.

The ancient philosophers, &c. are divided upon the subject of the engastrimythi. Hippocrates mentions it as a disease. Others will have it a kind of divination. Others attribute it to the operation or possession of an evil spirit. And others to art and mechanism. M. Scottus maintains that the engastrimythi of the ancients were poets, who, when the priests could not speak, supplied the defect by explaining in verse what Apollo dictated in the cavity of the bason on the sacred tripod.

ENGENDERING, a term sometimes used for the act of producing or forming any thing: thus meteors are said to be engendered in the middle region of the atmosphere, and worms in the belly.

ENGINE, in mechanicks, is a compound machine, made of one or more mechanical powers, as levers, pullies, screws, &c. in order to raise, cast, or sustain any weight, or produce any effect which could not be easily effected otherwise.

Engines are extremely numerous; some used in war, as the battering-ram, ballista, waggons, chariots, &c. others in trade and manufactures, as cranes, mills, presses, &c. others to measure time, as clocks, watches, &c. and others for the illustration of some branch of science, as the orrery, cometarium, and the like. See *Battering-RAM*, *BALLISTA*, &c. In general we may observe, concerning engines, that they consist of one, two, or more of the simple powers variously combined together; that in most of them the axis in peritrochio, the lever, and the screw are the constituent parts; that in all a certain power is applied to produce an effect of much greater moment; and that the greatest effect, or perfection, is when it is set to work with four ninths of that charge which is equivalent to the power, or will but just keep the machine in equilibrio. See *MAXIMUM* and *MECHANICKS*.

In all machines, the power will just sustain the weight, when they are in the inverse ratio of their distances from the centre of motion. See *POWER* and *EQUILIBRIUM*.

It being of the utmost importance to diminish the

friction of engines, several contrivances have been invented for this purpose. See *FRICTION*.

ENGINE for extinguishing fires, a machine for raising a considerable quantity of water, in one continued stream, for the extinguishing accidental fires.

The best engine of this kind is that of Mr. Newsham, an engine-maker of London, which is so contrived that part of the men who work it, exert their strength by treading, the very best way of working such engines, the whole weight of the body being successively thrown on the forces of the pumps; and even part of a man's strength may be added to the weight, by means of horizontal pieces, to which he may apply his hands when treading. This is the reason why, with the same number of men, his engine will throw water further, higher, and in greater quantities than any engines of the same size, hitherto contrived. See a perspective-view of the whole engine, ready for working (in plate XXXIII. fig. 3.)

The nature and effect of this engine will be easily understood from a perpendicular section of it represented (fig. 1.) The water is raised by the pressure of the atmosphere, by the force of the pistons, and by the spring of condensed air, in the following manner: thus, when the piston R is raised, a vacuum would be made in the barrel T V, did not the water follow it from the inferior canal E M (through the valve H) which rises through the glass tube E F, immersed in the water of a vessel, by the pressure of the atmosphere on the surface thereof. By the depression of the piston R, the water in the barrel T V is forced through the superior canal O N, to enter by the valve I, into the air-vessel *abcd*; and the like being done alternately by the other barrel W X, and its piston S, the air-vessel is by this means continually filling with water, which greatly compresses the air above the surface of the water in the vessel, and thereby proportionably augments its spring, which is at length so far increased, as to re-act with great force on the surface Y Z of the subjacent water; which ascending through the small tube *ef*, to the stopcock *eg*, is there, upon turning the cock *p*, suffered to pass through a pipe *b*, fixed to a ball and socket, from the orifice of which it issues with great velocity, to a very great height or distance, in a small continued stream, directed every way, or to any particular place, by means of the ball and socket.

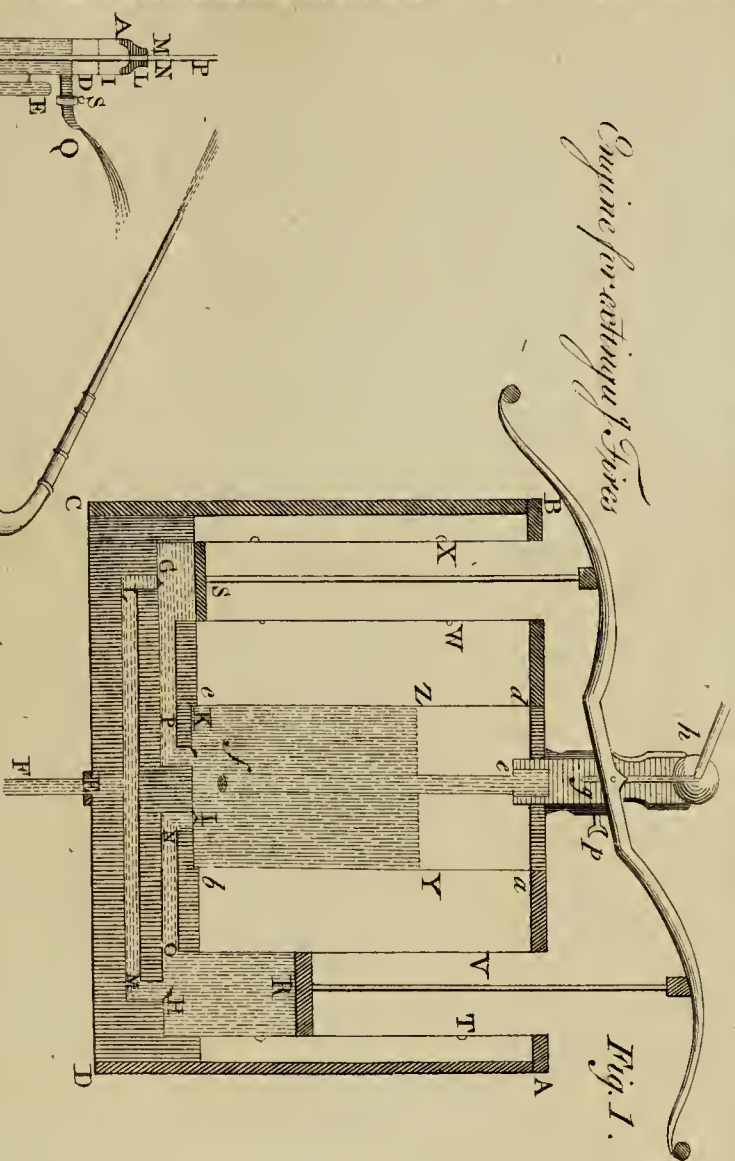
The greatest artifice of this engine is its contrivance to produce a continued stream, which is done by compression, and the consequent increased elasticity of the air in the barrel *abcd*, called the air-vessel. See *AIR*.

When, therefore, the air-vessel is half filled with water, and the air thereby compressed into half its first space, its spring will be equal to twice the pressure of the atmosphere; so that, on turning the stop-cock *p*, the air within pressing on the subjacent water with twice the force it meets with from the external air in the pipe *ef*, will cause the water to spout out of the engine to the height of 32 or 33 feet, if the friction be not too great. When the air-vessel is  $\frac{2}{3}$  full of water, the space which the air takes up is only  $\frac{1}{3}$  of its first space; whence its spring being three times as great as that of the common air, it will project the water with twice the force of the atmosphere, or throw it to the height of 64 or 66 feet. In the same manner, when the air-vessel is  $\frac{3}{4}$  full of water, the air will project it to the height of 96 or 99 feet; and when  $\frac{4}{5}$  full of water, to the height of 132 feet. Hence it is easy to calculate the different heights to which the water will rise, as in the following table.

Height of the water.	Height of the compressed air.	Proportion of the air's spring.	Height to which the water will rise.
$\frac{1}{2}$	$\frac{1}{2}$	2	33 feet.
$\frac{2}{3}$	$\frac{1}{3}$	3	66
$\frac{3}{4}$	$\frac{1}{4}$	4	99
$\frac{4}{5}$	$\frac{1}{5}$	5	132
$\frac{5}{6}$	$\frac{1}{6}$	6	165
$\frac{6}{7}$	$\frac{1}{7}$	7	198
$\frac{7}{8}$	$\frac{1}{8}$	8	231
$\frac{8}{9}$	$\frac{1}{9}$	9	264
$\frac{9}{10}$	$\frac{1}{10}$	10	297

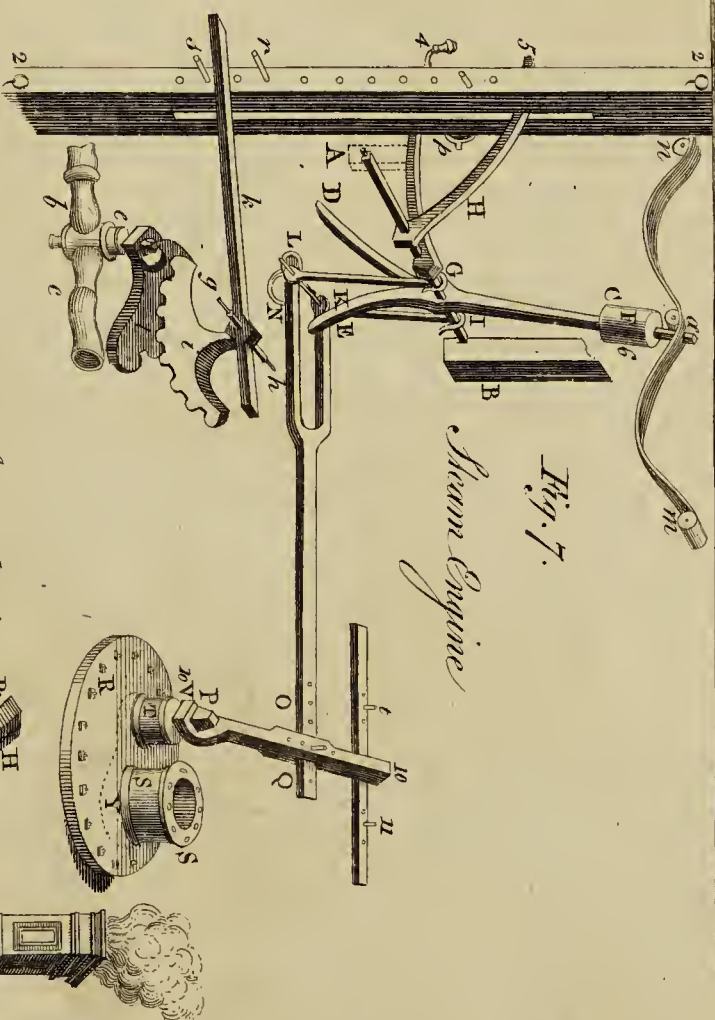


*Engine for extracting Fires*



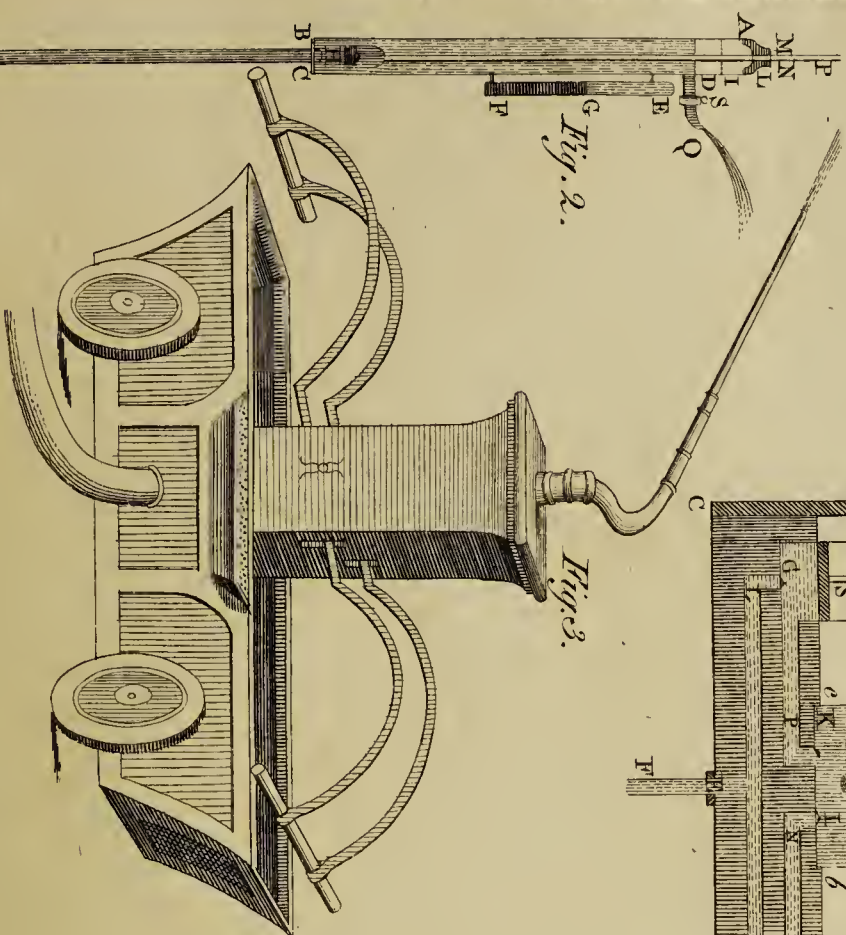
*Fig. 1.*

*Steam Engine*



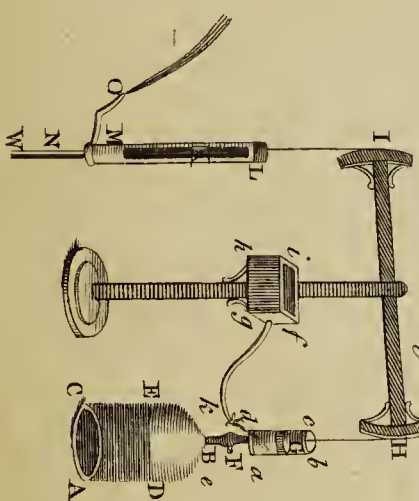
*Fig. 7.*

*Fig. 2.*

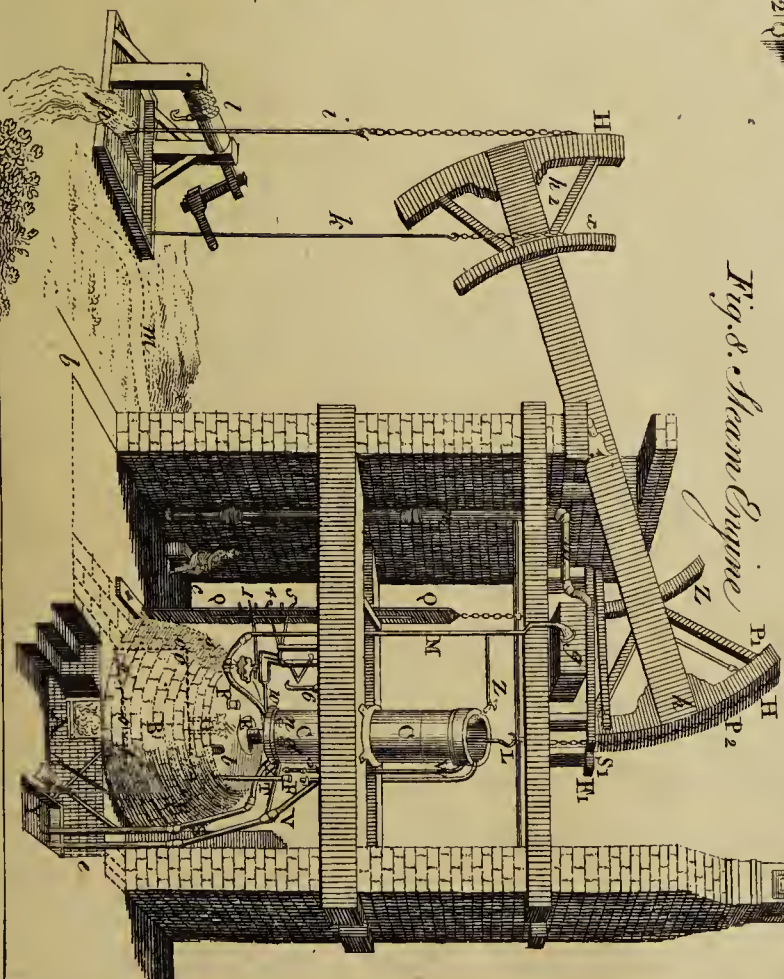


*Fig. 3.*

*Fig. 6. Steam Engine*



*Fig. 8. Steam Engine*



*Facing Engine.*

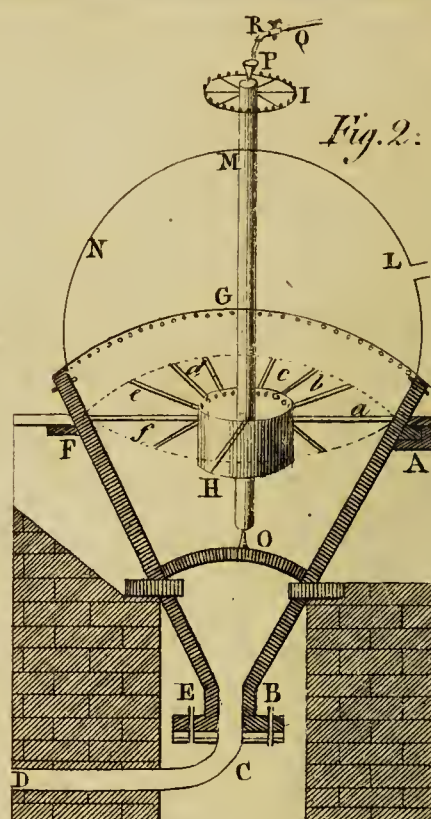
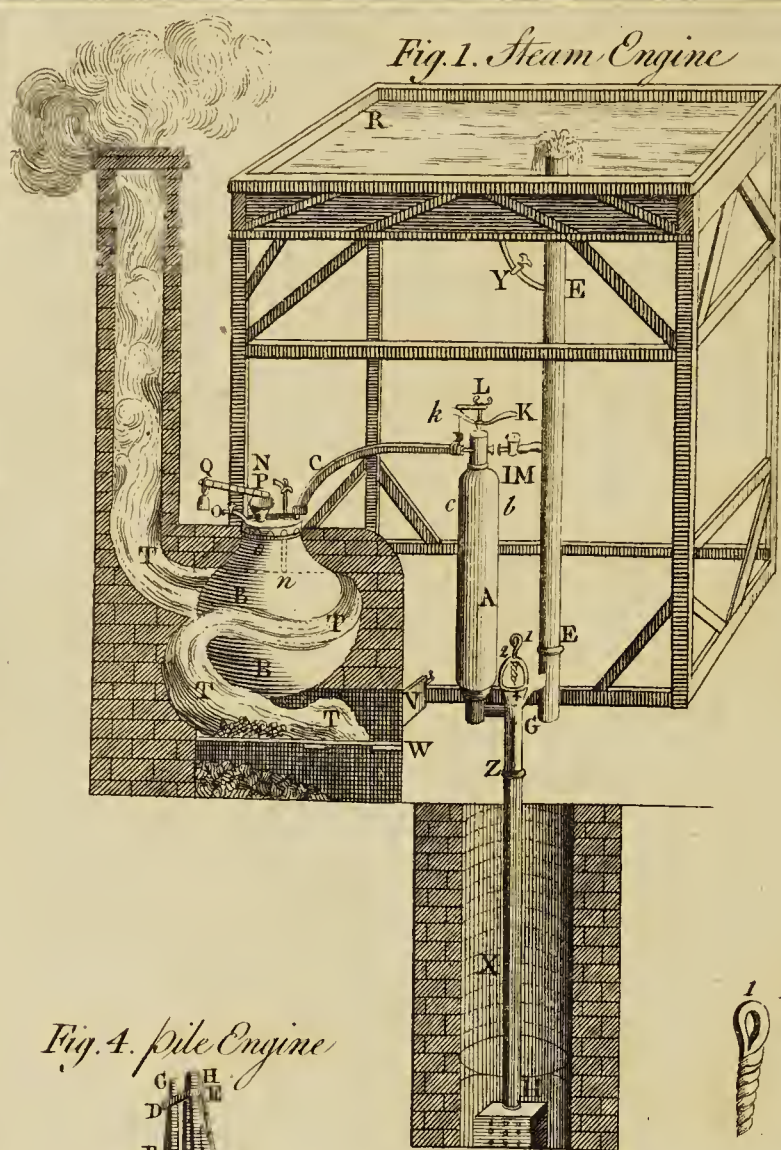




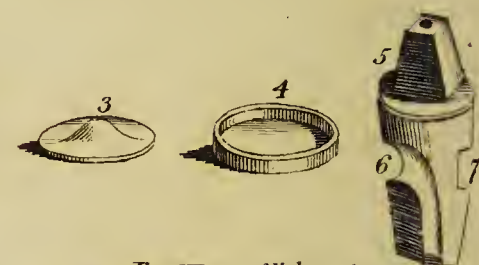
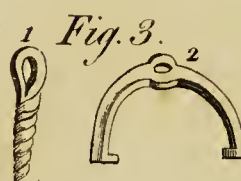
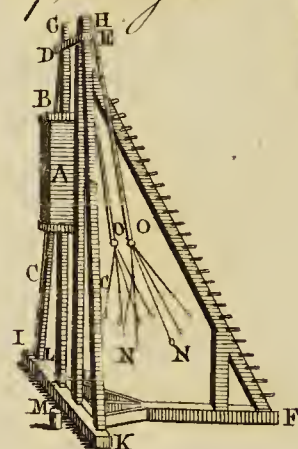






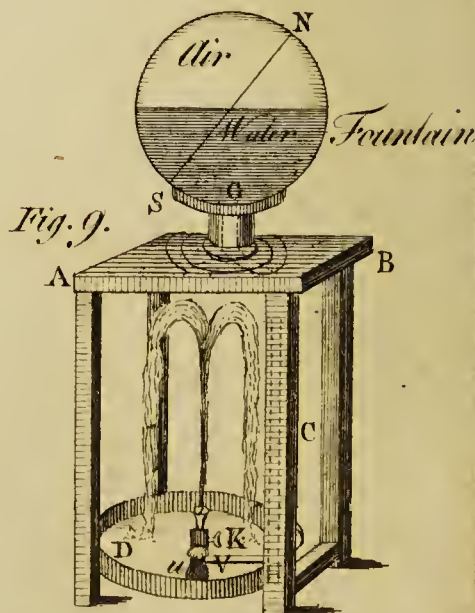
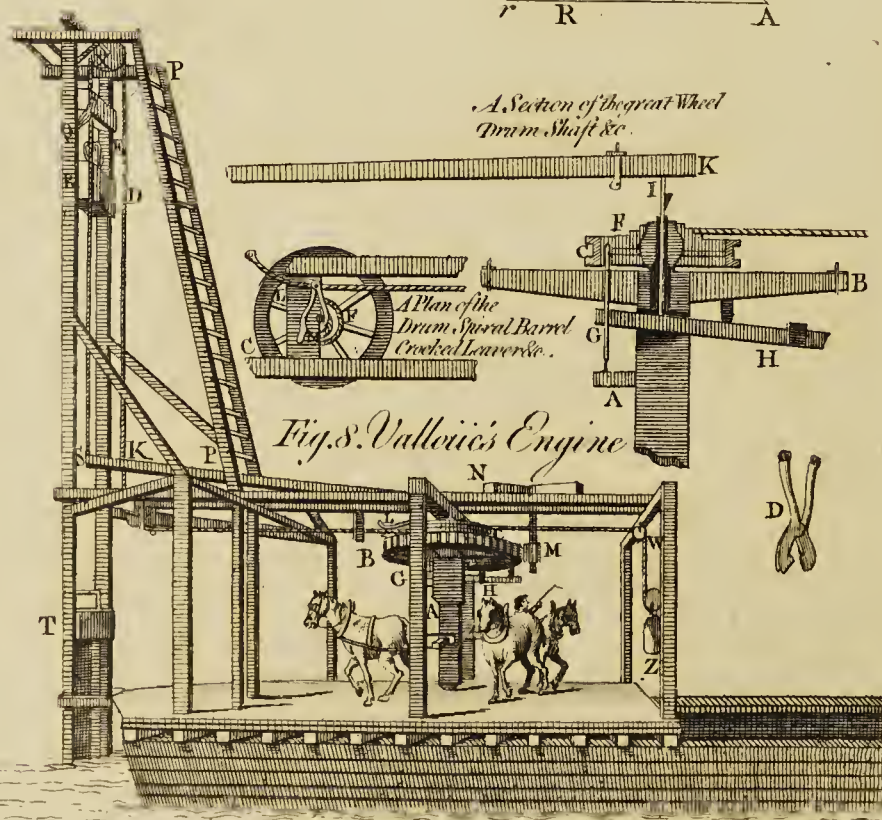
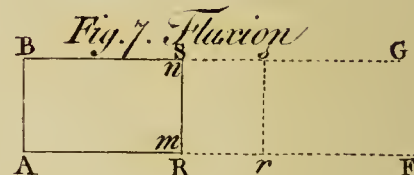
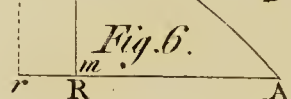
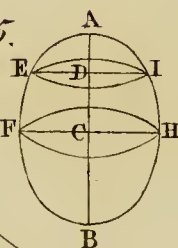


*Fig. 4. Pile Engine*



*Fig. 5.*

*Fluxion*





As the air-vessel is the cause of the continued stream, we may naturally infer, that if such an air-vessel were adapted to the common house pump, it would become a useful engine for extinguishing accidental fires. Now this may be effected in the following or some other analogous manner: let ABCD (*plate XXXIII. fig. 2.*) be the barrel of the pump; PH the rod and piston, CW the pipe going down to the water of the well at W. Towards the lower part of the barrel, is a short tube, by which the air-vessel FE is fixed to, and communicates with, the barrel of the pump. AMNL is a collar of leather, so fixed on the top of the barrel, and adapted to the rod, that it may move freely in the leathers, without permitting the air to pass in or out between. The nozzle or spout D, has a stop-cock S, to let out or keep in the water at pleasure. Q is a piece screwed on, to direct the stream, by a small leather-pipe at the end. When the piston is raised from the bottom of the pump-barrel, the water above will be forced into the air-vessel, and there compresses the air; it will also compress the air on the top of the barrel, for the water will not be higher than the spout D at first, when the stop-cock is shut; but afterwards, as the air is confined, it will be compressed at top, the water rising to I. This compressed air, in each place, will act upon the water by its spring, and, upon turning the stop-cock, will force it out in a continued stream through the pipe at Q, and that with a greater or lesser degree of force, as occasion requires, that being absolutely in the power of the person working the pump.

**Pile-ENGINE**, one contrived for driving piles, whereof there are several kinds. See **PILE**.

The most common and simple engine of this kind, as represented (in *plate XXXIV. fig. 4.*) consists of the cill KI, and the frame FL, on which are fixed the upright pieces LH and LG, supported by the side braces C, C, and the hind brace FE (which has pins on it to make it serve as a ladder) and held together by a square collar ED. The rammer A, being a very heavy piece of wood, or iron, slides up and down between the cheeks or upright pieces LH, LG, and is drawn up by means of its hook B, with two ropes HO, GO, having each five smaller ropes with handles at N, N, for ten men to pull up the rammer to a certain height (the great ropes running over two pulleys or rollers on the iron-pin HG) and then let it fall again all at once upon the head of the pile at M, to drive it into the ground. Now, suppose the rammer A, weighs 500 lb, and falls the height of one foot, it will fall that height in a quarter of a second, and consequently have a velocity able to carry it uniformly 2 feet in the same time, that is, at the rate of 8 feet in a second, at the very instant it strikes the pile M. Therefore, measuring the mass by the velocity, viz.  $500 \times 8$  we shall have 4000 for the momentum of the rammer with such a fall. But if the rammer be raised up to the height of four feet, it will fall that height in half a second, and have, at the time of percussion, a velocity to carry it 8 feet in half a second, without any further help from gravity, so that we must now multiply 16 feet (the present velocity, since it goes at the rate of 16 feet in a second) by 500, the mass of the rammer, which will give us a double momentum, wherewith it will strike the pile in this last case; for  $500 \times 16 = 8000$ . If we consider any other height from which the rammer falls (for one may employ a capstan, windlass, or pulleys to raise it to a very great height) the momentum with which it strikes the pile, will always be as the square root of the height from which the rammer fell.

If a pile is to be driven obliquely, the engine must be set so that the cheeks may have the same obliquity, and the blow will still be perpendicular to the head of the pile; but then the force of the blow must not be estimated from the length, but from the height of the descent, in the manner already shewn.

**Mr. Valiè's ENGINE** for driving Piles, used at the new bridge of Westminster, is constructed as follows. A (*plate XXXIV. fig. 8.*) is the great shaft, on which are the great wheel and drum: B the great wheel with cogs, that turns a trundle-head with a fly, to prevent the horse's falling when the ram is discharged; C the

drum on which the great rope is wound; D the follower (with a roller at one corner) in which are contained the tongs, to take hold of the ram, and are fastened to the other end of the great rope, which passes over the pulley, near the upper end of the guides, between which the ram falls; E the inclined planes, which serve to open the tongs, and discharge the ram; F the spiral barrel that is fixed to the drum, on which is wound a rope with a counterpoise, to hinder the follower from accelerating, when it falls down to take up the ram; G the great bolt which locks the drum to the great wheel; H the small lever, which has a weight fixed at one end, passes through the great shaft below the great wheel, and always tends to push the great bolt upwards, and lock the drum to the great wheel; I the forcing bar, which passes through the hollow axis of the great shaft, bears upon the small lever, and has near the upper end a catch by which the crooked lever keeps it down; K the great lever, which presses down the forcing bar, and discharges the great bolt at the time the long end is lifted up by the follower; L the crooked lever, one end of which has a roller, that is pressed upon by the great rope, the other end bears upon the catch of the forcing bar during the time the follower is descending; M the spring that presses against the crooked lever, and discharges it from the catch of the forcing bar as soon as the great rope slackens, and gives liberty to the small lever to push up the bolt.

By the horse's going round, the great rope is wound about the drum, and the ram is drawn up, till the tongs come between the inclined planes, where they are opened, and the ram is discharged.

Immediately after the ram is discharged, the roller, which is at one end of the follower, takes hold of the rope that is fastened to the long end of the great lever, and lifts it up; the other end presses down the forcing bar, unlocks the drum, and the follower comes down by its own weight.

As soon as the follower touches the ram, the great rope slackens, and the spring M discharges the crooked lever from the catch of the forcing bar, and gives liberty to the small lever to push up the great bolt, and to lock the drum to the great wheel, and the ram is drawn up again as before.

**Steam-ENGINE**, a machine to raise water by fire, or rather by the force of water turned into steam.

The following is a description of this engine in its first state, and original simplicity. ABC (*plate XXXIII. fig. 6.*) is a copper vessel, partly filled with water to DE, which, being set over a fire and made to boil, will fill the upper part DBE with an elastick vapour, the sufficient strength whereof is known by its forcing open a valve at e: this heated elastick steam is, by turning a cock at F, let into the barrel *abcd*, where, by its elastick force, it raises the piston G, which drives the air above it through a proper clack at the top. After this, that the piston may by its weight descend, a little cold water from the cistern *fgbi*, is let in at the bottom by turning a cock at k, which, in form of a jet, condenses the hot steam in the barrel into 13000 times less space than before it took up, which make a sufficient vacuum for the piston to descend in. The piston G, and lever HI being thus put into motion, do accordingly raise and depress the piston K in the barrel of the forcing pump LM, on the other side; which, by the pipe N, draws the water from the depth W, and forces it to rise and spout through the tube O, continued to any height at pleasure.

Thus is the steam-engine a very simple and plain machine, where a very powerful stroke for working of pumps is performed by only turning two cocks alternately; and yet a person who knows nothing of it, would imagine it to be very complex, by the number of parts that offer themselves to view. But here we must distinguish between what performs the material operations of the engine, and what serves for convenience and the just regulation of the said operations; for not above the hundredth part of the power of this engine is employed to turn the cocks and regulate all the motions, as will appear from what follows.

The structure of the steam-engine, as used at present,



sent, is represented (in *plate XXXIII. fig. 8.*) concerning which we are to observe, 1. That there may be always water in the cistern *g*, to inject into the steam to condense it, there is an arch *x*, fixed near the arch *H*, at the pump end, from whence another pump-rod *k*, with its piston, draws water from a small cistern near the mouth of the pit, supplied from the water raised at *p*, and forces it up the pipe *mmm*, to keep the injecting cistern *g* always full. 2. As the piston *C* which moves up and down the cylinder ought to be air-tight, a ring of leather, or a piece of match, which lies upon its circumference next to the inside of the cylinder, must be kept moist and swelled with water; this is supplied from the injecting cistern by a small pipe *z*, always running down upon the piston, but in a very small quantity, if the work be well performed. *L* is a leaden cup, whose office is to hold the water that lies on the piston, lest it should flow over when the piston is arrived at its greatest height in the cylinder, as *W*, at which time if the cup is too full, the water will run down the pipe *L V*, into the waste-well at *Y*. 3. As the water, in the boiler *B*, must waste by degrees, as it is constantly producing steam, and that steam continually let out for working the engine, there ought to be a constant supply of the water to boil: this is performed by means of the pipe *F f*, about three feet long, going down a foot under the surface of the water in the boiler, with a funnel *F*, at top, always open, and supplied by the pipe *W*, with water from the top of the cistern, which has the advantage of being always warm, and, therefore not apt to check the boiling of the water in the copper. 4. That the boiler may not have the surface of the water too low (which would endanger bursting) or too high (which would not leave room enough for steam) there are two gauge-pipes at *G*, one going a little below the surface of the water when at a proper height, and the other standing a little above it: when every thing is right, the stop-cock of the shorter pipe being opened gives only steam, and that of the long one water; but if otherwise, both cocks will give steam when the surface is too low, and both give water when it is too high; and hence the cock which feeds the boiler at *F* may be opened to such a degree as always to keep the surface of water to its due height. 5. As cold water is injected into the cylinder at every stroke, and as that water might in time fill the cylinder, and hinder the operation of the engine, there is a pipe coming from the bottom of the cylinder *d T Y*, called the eduction pipe, through which the water that has been injected, comes down every time the steam is let into the cylinder. This eduction pipe goes an inch or two under water in the waste well *Y*, and having its end turned up is shut with a valve *Y* to keep out the air from pressing up the pipe, but permitting the injected air coming the other way to be discharged; by which means the cylinder is kept empty. 6. Lest the steam should grow too strong for the boiler, and burst it, there is a valve fixed at *b*, with a perpendicular wire standing up from the middle of it, to put weights of lead upon, by which to examine the strength of the steam pushing against it from within. Thus the steam is known to be as strong as the air, if it will raise up so much weight on the valve as is at the rate of 15 lb. to an inch square; because that is the weight of the air, nearly, on every inch square. When the steam becomes stronger than what is required, it will lift up the valve and go out. This valve is called the puppet-clack. 7. The steam is always in a fluctuating condition, yet never  $\frac{1}{10}$  stronger or weaker than common air. For it has been found that the engine will work well, when there is the weight of one pound on every square inch of the valve *b*. This shews that the steam is then  $\frac{1}{15}$  part stronger than the common air. Now as the height of the feeding pipe from the funnel *F* to the surface of the water *S s* is not above three feet, and  $3\frac{1}{2}$  feet of water is  $\frac{1}{10}$  of the pressure of air; if the steam were  $\frac{1}{10}$  part stronger than air, it would push the water out at *E*; which since it does not do, it cannot be stronger than air, even in this case, where the regulator being shut, it is most of all confined. 8. When the regulator is open, the

steam gives the piston a push on the under side, then occupying more space, the steam comes to be a balance only for the outward air, and so only sustains the piston; but the over weight of the pump-rods, at the contrary end of the beam *b 2*, draws up the piston beyond *C* as far as *W*. The steam then expanded so as to fill up all the cylinder, would not quite support it, if it was not for the over-weight above mentioned. If this was not true, when the end *b 2* is down as low as it can go, and rests upon the beams that bear its centre, the chain *L H* above the piston would grow slack, and the piston might sometimes be pushed out of the cylinder, which never happens. Again, when first the steam is let into the cylinder, the ejected water is pushed out at the eduction pipe *d T Y*, and is all out of the cylinder by that time the piston is got up to *C*. If then the steam was stronger than air, it would fly out at *Y* after the water, the valve *Y* not being loaded. If it were exactly equal to the strength of the air, it would just drive all the water out at *Y*, but could not follow itself, the pressure being equal on each side of the valve by supposition. If it be weaker than the air, it will not force all the water out of the pipe *d T Y*, but the surface will stand, suppose at *T*, where the column of water *T Y*, added to the strength of the steam, is equal to the pressure of the air. When the steam is  $\frac{1}{10}$  weaker than the air, the height *T Y* is equal  $3\frac{1}{2}$  feet. Now since the whole perpendicular distance from *d* to *Y* is but four feet, and the steam is always sufficient to expel the water; it is plain it can never be more than  $\frac{1}{10}$  part weaker than the air, when weakest. 9. As there is air in all the water injected, and that air cannot be taken out, or condensed with the steam by the jet of cold water coming in at *n*, the whole operation would be disturbed, and only a very imperfect vacuum made, were it not for the following contrivance. We are to remember that when steam is become as strong as air, it is above sixteen times rarer; so that air will precipitate in steam, as quicksilver would in water. Therefore all the air extricated from the injected water, lies at the bottom of the cylinder over the surface of so much of the injected water as is come down to *dn*. Now there is without the cylinder at *4*, a little cup with a valve, and from under the valve, a pipe going laterally into the cylinder above its bottom to receive the air into the cup. When, therefore the steam first rushes into the cylinder, and is a little stronger than the outward air, it will force the precipitated air to open the valve at *4*, and make its escape; but the steam cannot follow, because it is weaker than the external air, as the piston, by ascending, gives it room to expand. This valve from the noise it makes is called the shifting clack. 10. But, amongst the greatest improvements of this engine, we may reckon that contrivance by which the engine itself is made to open and shut the regulator and injection-cock, and that more nicely than any person attending could possibly do it. For if the man who turns the regulator at *E*, and the injection cock *N*, when the piston is coming down, opens the regulator and lets in the steam too soon to raise the piston again, the stroke will be shorter than it ought to be; and if he does not open the regulator soon enough, the piston coming down with a prodigious force, will very probably strike against the throat pipe *D d* at *d*, and crush it to pieces. Likewise when the regulator is open, the steam going into the cylinder, and the piston rising, the stroke will not have its full length, if the steam is turned off, and the cold water injected too soon; and if injected too late, the steam may throw the piston quite out of the cylinder's top at *L*. To prevent, therefore, all such accidents, there is fixed to an arch *Z*, at a proper distance from the arch *P*, a chain, from which hangs a perpendicular piece, or working beam *Q Q*, which comes down quite to the floor, and goes through it in a hole which it fits very exactly. This piece has a long slit in it, and several pin-holes and pins for the movement of several levers destined to the office of opening and shutting the cocks after the following manner. 11. Between two perpendicular pieces of wood on each side of *P*, there is a square axis *A B* (*plate XXXIII. fig. 7.*) which has



has upon it several iron pieces of the lever kind. The first is the piece *CED* called the *Y*, from its representing that letter inverted by its two shanks, *E* and *D*; on the upper part is a weight *F*, to be raised higher and lower, and fixed as occasion requires. This *Y* is fixed very fast upon the said iron axle *AB*. 12. From the axle hangs a sort of an iron stirrup, *IKLG*, by its two hooks *IG*, and having on the lower part two holes *KL*, through which passes a long iron pin *LK*, and keyed in the same. When this pin is put in, it is also passed through the two holes in the ends *EN* of the horizontal fork or spanner *EQN*, joined at its end *Q* to the handle of the regulator *V* 10. From *Q* to *O* are several holes, by which the said handle may be fixed to that part of the end which is most convenient. 13. Upon the axis *AB* is fixed at right angles to the *Y* an handle or lever *G* 4, which goes on the outside of the piece *QQ*, and lies between the pins. Another handle is also fastened upon the same axle, viz. *H* 5, and placed at half a right angle to the former *G* 4; this passes through the slit of the piece *QQ*, lying on one of its pins. Hence we see that when the working beam goes up, its pin in the slit lifts up the spanner *H* 5, which turns about the axle so fast, as to throw the *Y* with its weight *F* from *C* to *6*, in which direction it would continue to move after it passed the perpendicular, were it not prevented by a strap of leather fixed to it at *a*, and made fast at the ends *m* and *n*, in such manner as to allow the *Y* to vibrate backwards and forwards about a quarter of a circle, at equal distance on this side and that of the perpendicular. 14. As things are represented in the figure, the regulator is open, its plate *TY* being shewn on one side of the pipe *S*, which joins the cylinder and boiler. The piston is now up, and also the working beam near its greatest height, the pin in the slit has so far raised the spanner *H* 5, that the weight *F* on the head of the *Y* is brought so far from *n*, as to be past the perpendicular and ready to fall over towards *m*, which when it does, it will by its shank *E*, strike the iron pin *KL* with a smart blow, and drawing the fork *ON* horizontally towards the beam *Q*, will draw the end 10 of the regulator towards *t*, and thereby shut it, by slipping the plate *Y* under the holes of the throat-pipe *S*. 15. Immediately after the regulator is shut, the beam rising a little higher with its pin *S* on the outside upon the lower part, lifts up the end *i* of the handle of the injecting-cock, and opens it by the turning of the two parts with teeth. The jet immediately making a vacuum, the beam again descends, and the pin *r* depressing the handle *ki*, shuts the injection-cock; and the beam continuing to descend, the pin *p* bears down the handle *G* 4, and throwing back the *Y*, its shank *D* throws forward the fork *NQ*, and again opens the regulator to receive fresh steam. After this every thing returns as before, and thus is the engine most wonderfully contrived to work itself. 16. Many years after the engine had been made, as above described, it received another improvement of very great advantage, and that was, instead of feeding the boiler with warm water, from the top of the cylinder (*fig* 8.) by the pipe *W* above, and *Ff* below, they contrived to supply it with the scalding hot water which came out of the eduction-pipe *d* *TY*, which now, instead of going into the waste well at *Y*, was turned into the boiler on the top, and as the eduction pipe before went out at the side of the cylinder, it was now inserted in the bottom of it; and though the pressure of the steam in the boiler be somewhat stronger than in the cylinder, yet the weight of water in the eduction-pipe being added to the force of steam in the cylinder will carry the water down continually, by overcoming the resistance in the boiler.

This is the lever-engine with the improvements of Mr. Newcomen and others; but as captain Savary's, or rather the marquis of Worcester's, is very cheap in respect of this machine, and as it is also applicable with great advantage when the height to which the water is to be raised does not exceed 100 or 150 feet, we shall here subjoin a view of that engine, with the improvements of Dr. Defaguliers.

The boiler *BB* (*plate* XXXIV. *fig* 1.) is a large

copper-body of a globular form, which will best of all withstand the very great force of steam that in this case is necessary. Round the body of this boiler the fire and flame are conducted as shewn at *TTT*. It has a copper-cover screwed on, which contains the steam-pipe *CD*, and two gauge-pipes *n, o*, which by turning their cocks, shew the height of the water within as in the other engine. On the same cover *P* is a valve, over which lies a steel-yard, with its weight *Q* to keep it down, the strength of the vapour being this way most exactly estimated. For being in the nature of a lever of the third sort, it is plain, if the beam of the lever be divided into ten equal parts, and the first of them be upon the middle of the valve, and the weight *Q* hangs at the 2d, 3d, 4th, &c. divisions, that then the force of the steam which can raise up the valve will be 2, 3, 4, &c. times as great as the weight. If the area of the valve be a square inch, and *Q* = 15 lib. hanging at the second division is raised by a steam pushing up the valve, it will shew that the steam will then press with the force of two atmospheres, and so on to ten atmospheres; but great care must be then taken that the steam so very strong burst not the boiler to pieces. The steam is carried from the boiler to a copper-vessel *A*, by means of the pipe *CD*, and is let into it by turning the handle *K* of the steam-cock *DI*. The key of this cock is kept down by the screw *L*, held up by the gibbet *DL*. The handle turned from *K* to *k* admits a passage to the steam into the copper-receiver *A*. This receiver *A* communicates at bottom with the sucking pipe *ZH* going down to the water *H* in the well *X*, and above with the forcing pipe *EE*, which goes up a little above the water of the reservoir *R*, and between these pipes are two valves *F* and *G* both opening upwards. The steam being let in upon the water of the receiver *A*, forces it up through the valve *F*, and the pipe *EE* to the reservoir, and then the receiver is full of hot steam. This steam in the receiver is condensed by a jet of cold water coming from the forcing pipe by the small pipe *MI*, being let in and shut off by the cock at *M*. The steam being condensed by this jet will be reduced within a very small space, and so make a vacuum, upon which the water in the well will rush up into the forcing pipe to restore the equilibrium, and thus again fill the receiver *A*, the little air being compassed within a small compass at the top above *bc*. That there may be always water in the force-pipe for the jet, there is a little pipe which brings the water to it from the reservoir with the small stop-cock *Y*, to shut it off upon occasion. The valves at *F* and *G* are examined at any time by unscrewing the pin 1 to loosen the strap 2, and let down the flanch 3, all which parts are shewn larger (*in fig* 3.) By the particular contrivance of the cock at *DI*, and its key, the water is made to pass from the force-pipe to the boiler to supply the waste in steam. This is plainly shewn in the sections of the cock and key, where 5 is the top of the key, 6 is a hole on one side, which goes down to the bottom to convey the steam, or jet of water alternately to the receiver; 7 is a notch on the other side to take in the water from the force-pipe, and conduct it to the boiler *B*. How this is done is easy to conceive from a view of the two sections of the cock and key, in two positions within it. The boiler may hold about five or six hogsheads, and the receiver one hogshead. It will work four or five hours without recruiting: about four strokes a minute will produce upwards of 200 hogsheads per hour. This steam makes a vacuum so effectually, as to raise water from the well to the height of 29 or 30 feet; and suppose the steam able to lift up the steel-yard with its weight hanging at the 6th division, it will then be able to raise a column of water above 50 yards high, as being then six times stronger than the pressure of the atmosphere, as is easily understood from what has been said upon the fire-engine, the water being raised in a similar manner in both machines, there by the pressure of condensed elastick air, and here by the pressure of rarefied elastick steam. See *ENGINE for extinguishing fires*.

This engine consists of so few parts, that it comes very cheap in proportion to the water that it raises, but it has its limits. On the other hand, the lever-engine,



engine, often called Newcomen's, has its limits also; that is, it must not be too small, for then it will have a great deal of friction in proportion to the water that it raises, and will cost too dear; having as many parts as the largest machines, which are the best and cheapest in proportion to the water they raise.

In the philosophical transactions there is an account of an improvement made in the steam-engine by Mr. Payne, as follows. He has contrived two iron-pots or vessels of a conical form inverted as represented by A B E F (*plate XXXIV. fig. 2.*) on the upper part of which is fixed a globular copper-head, of about  $5\frac{1}{2}$  feet diameter, as L M N. Then there is placed on the inside a small machine H, called the dispenser, with spouts *abcde*, &c. round the sides fixed to it, and the bottom thereof rests on a centre pin O. In this machine is fixed an upright tube G with holes at the bottom, and a funnel P on the top, to receive a spout of water from a conduit-pipe Q, by the stop-cock R. Two or more of these vessels are placed in a reverberatory arch for conveying the intense heat of a strong fire, the flame whereof encompasses the iron-vessels, and keeps them in a red heat during the time of their use, at which time the cog-wheel I, being turned by proper machinery, whirls the dispenser about with great velocity, and causes the water in it to fly through the spouts against the sides of the red hot pots. By this means the greatest part of the water is converted into vapour or elastic steam, which is conveyed by a common pipe and cock to the barrel of the engine to put the piston in motion, and the waste water is conveyed away at bottom by means of a pipe C D, with a valve at D to keep out the air.

ENGINEER, or *INGINEER*, properly signifies one skilled in the nature of engines in general; but it is commonly applied to an officer who is appointed to inspect and contrive any attacks, defences, &c. of a fortified place.

ENGLAND, the southern division of Great Britain, situated in the Atlantick ocean, between the second degree east and sixth degree west longitude, taking the first meridian from London, and between  $49^{\circ} 55'$  and  $55^{\circ} 55'$  north latitude.

There are in England, including Wales, 52 counties, two archbishopricks, 24 bishopricks, two universities, 29 cities, upwards of 800 towns, and near 10000 parishes; supposed to contain about 7000000 of persons.

ENGLISH, or the *ENGLISH-TONGUE*, the language spoken by the people of England, and, with some variation, by those of Scotland, as well as part of Ireland, and the rest of the British dominions.

The ancient language of Britain is generally allowed to have been the same with the Gaulick; this island, in all probability, having been first peopled from Gallia, as both Cæsar and Tacitus affirm, and prove by many strong and conclusive arguments, as by their religion, manners, customs, and the nearness of their situation. But now we have very small remains of the ancient British tongue, except in Wales, Cornwall, the islands and highlands of Scotland, part of Ireland, and some provinces of France; which we do not appear strange, when what follows is considered.

Julius Cæsar, some time before the birth of our Saviour made a descent upon Britain, though he may be said rather to have discovered than conquered it; but, about the year of Christ 45, in the time of Claudius, Aulus Plautius was sent over with some Roman forces, by whom two kings of the Britons, Codigunus and Caractacus, were both overcome in battle: whereupon a Roman colony was planted at Malden in Essex, and the southern parts of the island were reduced to the form of a Roman province; after that, the island was conquered as far north as the firths of Dumbarton and Edinburgh, by Agricola, in the time of Domitian; whereupon, a great number of the Britons, in the conquered part of the island, retired to the west part called Wales, carrying their language with them.

The greatest part of Britain being then become a Roman province, the Roman legions, who resided in Britain for above 200 years, undoubtedly disseminated the Latin tongue; and the people being afterwards go-

vern'd by laws written in Latin, must necessarily make a mixture of languages. This seems to have been the first mutation the language of Britain suffered.

Thus the British tongue continued, for some time, mixed with the provincial Latin, till, the Roman legions being called home, the Scots and Picts took the opportunity to attack and harass the country: upon which, K. Vortigern, about the year 440, called the Saxons to his assistance, who came over with several of their neighbours, and having repulsed the Scots and Picts, were rewarded for their services with the isle of Thanet, and the whole county of Kent: but growing too powerful, and not being contented with their allotment, dispossessed the inhabitants of all the country on this side of the Severn: thus the British tongue was in a great measure destroyed, and the Saxon introduced in its stead.

What the Saxon tongue was long before the conquest, about the year 700, we may observe in the most ancient manuscripts of that language, which is a gloss on the Evangelists, by bishop Edfrid, in which the three first articles of the Lord's prayer run thus.

"Uren fader the arth in heofnas, sic gehalgod  
"thin noma, so cymeth thin ric. Sic thin willa sue  
"is heofnas, and in eorlho, &c."

In the beginning of the ninth century, the Danes invaded England, and getting a footing in the northern and eastern parts of the country, their power gradually increased, and they became sole masters of it in about 200 years. By this means the language of the country obtained a tincture of the Danish language: but their government, being of no long continuance, did not make so great an alteration in it, as the next revolution, when the whole land, A. D. 1067, was subdued by William the Conqueror, duke of Normandy in France: for the Normans, as a monument of their conquest endeavoured to make their language as generally received as their commands, and thereby rendered the English language an entire medley.

About the year 900, the Lord's prayer in the ancient Anglo-saxon, ran thus: "Thu ure fader the eart on  
"heofenum, si thin nama gehalgod; cume thin rice;  
"si thin willa on eorlhan swa, swa on heofenum, &c."

About the year 1160, under Hen. II. it was rendered thus by pope Adrian, an Englishman, in rhyme:

"Ure fader in heaven rich,  
"Thy name be hayled ever lich,  
"Thou bring us thy michell blisse:  
"Als hit in heaven y-doe  
"Evar in yearth beene it also, &c."

Dr. Hickes gives us an extraordinary specimen of the English, as spoken in the year 1385, upon the very subject of the English tongue.

"As it is knowe how meny maner peple beeth in  
"this lond; there beeth also so many dyvers longages  
"and tonges. Notheleß Walschemen and Scots that  
"beeth nought medled with other nations, holdeth  
"wel nyh hir firste longage and speche; but yif the  
"Scottes that were sometime confederat and woned  
"with the Pictes drawe somewhat after hir speche; but  
"the Flemynges that woneth on the weste side of  
"Wales, haveth lost her strange spech and speketh  
"Saxonliche now. Also Englyshemen, they had from  
"the bygynnyng the maner speche: northerne,  
"southerne, and middel speche in the middel of the  
"lond, as they come of three maner of peple of  
"Germania: notheles by commyxtion and mellynge  
"first with Danes, and afterwards with Normans in  
"meny the contrary longage is apayred. (corrupted.)  
"This apayryng of the burthe of the tunge is  
"bycause of tweie thynges; oon is for children in scole  
"agenst the usuage and maner of all other nations,  
"beeth compelled for to leve hire own longage, and  
"for to construe hir lessons and here thynges in  
"French, and so they haveth sethe Normans come first  
"into Engclond. Also gentlemen children beeth taught  
"to speke Frensche from the tyme that they beeth  
"rokked in here cradel, and kunneth speke and play  
"with a childe broche; and uplondische men will  
"lykne hymself to gentilmen, and fondeth with great  
"besynesse



“besynesse for to speake Frensche to be told of.---Hit seemeth a greet wonder how Englischemen and her own longage and tonge is so dyverse of fown in this oon ilond; and the longage of Normandie is comlynge of another lond, and hath oon manner fown amonge alle men that speketh hit arigt in Engeland. Also of the foresaid Saxon tonge that is deled (divided) a three, and is abide scarceliche with fewe uplondische men is greet wonder. For men of the est, with men of the west, is, as it were, undir the same partie of hevene acordeth more in fownynge of speche, than men of the north, with men of the south. Therefore it is that mercii, that beeth men of myddel Engeland, as it were, parteners of the endes, understondeth better the fide longages northerne and southerne, than northerne or southerne understondeth either other.---All the longage of the Northumbers, and spechialliche at York, is so scharp, flitting and frotynge, and unschape, that we southerne men may that longage unnethe understonde, &c. *Hicks's Thesaur. linguar sept.*”

In the year 1537, the Lord's prayer was printed as follows: “O oure father which arte in heven, halowed be thy name: let thy kindome come, thy will be fulfilled as well in erth as it is in heven; geve us this daye oure dayly bred, &c.” Where it may be observed that the diction is brought almost to the present standard, the chief variations being only in the orthography. By these instances, and many others that might be given, it appears, that the Anglo-Saxon language, of which the Normans dispoiled us in a great measure, had its beauties, was significant and emphatical, and preferable to what they imposed on us. “Great, verily,” says Camden, “was the glory of our tongue, before the Norman conquest, in this, that the old English could express, most aptly, all the conceptions of the mind in their own tongue, without borrowing from any.” Of this he gives several examples.

Having thus shewn how the ancient British language was, in a manner, extirpated by the Romans, Danes, and Saxons, and succeeded by the Saxon, and after that the Saxon blended with the Norman French, we shall now mention two other causes of change in the language: the first of these is owing to the Britains having been a long time a trading nation, whereby offices, dignities, names of wares, and terms of traffick are introduced, which we take with the wares from the persons of whom we have them, and form them anew, according to the genius of our own tongue; and besides this change in the language, arising from commerce, Britain's having been a considerable time subject to the see of Rome, in ecclesiastical affairs, must unavoidably introduce some Italian words among us. Secondly, as to the particular properties of a language, our tongue has undergone no small mutation, or rather has received no small improvement upon that account: for, as to the Greek and Latin, the learned have, together with the arts and sciences, now rendered familiar among us, introduced abundance; nay almost all the terms of art in the mathematicks, philosophy, physick, and anatomy; and we have retained many more from the Latin, French, &c. for the sake of neatness and elegance: so that, at this day, our language, which about 1800 years ago, was the ancient British, or Welch, &c. is now a mixture of Saxon, Teutonic, Dutch, Danish, Norman, and modern French, embellished with the Greek and Latin. Yet this, in our opinion, is so far from being a disadvantage to the English tongue, as now spoke (for all languages have undergone changes, and do continually participate with each other) that it has so enriched it, as now to become the most copious, significant, fluent, courteous, amorous and masculine language in Europe, if not in the world: This, indeed, was Camden's opinion of it in his time, and Dr. Heylin's in his: if then the English tongue, in the opinion of these learned authors, deserved such a character in their days, how much more now, having since received so considerable improvements from so many celebrated writers.

ENGRAFTING, or GRAFTING, in gardening. See the article GRAFTING.

ENGRAILED, or INGRAILED, in heraldry, implies a border broke in various places at the edges.

ENGRAVING, the art of cutting metals and precious stones, and representing thereon figures, letters, or whatever device or design the artist pleases.

Engraving, which is properly a branch of sculpture, is divided into several other branches according to the matter whereon it is employed, and the manner of performing it. The original way of engraving on wood is at present called cutting on wood; that on metals with aqua fortis is named etching; that by the knife, burnisher, punch and scraper, is called mezzotinto; that on tombs, &c. stone cutting, and that performed with the graver, on metals or precious stones, keeps alone the primitive name of engraving. See CUTTING on Wood, ETCHING, and MEZZOTINTO.

ENGRAVING on Copper, is employed in representing portraits, histories, landscapes, foliages, figures, buildings, &c. either after paintings, or designs, for that purpose. See DESIGN and PAINTING.

It is performed with the graver on a plate of copper, which, being well polished, is covered over thinly with virgin-wax, and then smoothed, while warm, with a feather, so that the wax be of an equal thickness on the plate; and on this the draught or design, done in black lead, red chalk or ungummed ink, is laid with the face of the drawing on the wax: then they rub the back-side, which will cause the whole design of the drawing to appear on the wax. The design, thus transferred, is traced through on the copper, with a point, or needle; then heating the plate, and taking off the wax, the strokes remain to be followed, heightened, &c. according to the tenor of the design, with the graver, which must be very sharp, and well pointed. See GRAVER.

In the conduct of the graver consists almost all the art, which depends not so much upon rules as upon practice, the habitude, disposition, and genius of the artist, the principles of engraving being the same with those of painting; for if an engraver be not a perfect master of design, he can never hope to arrive at a degree of perfection in this art. In conducting the strokes, or cuts, of the graver, he must observe the action of the fingers, and of all their parts, with their out-lines; and remark how they advance towards, or fall back from his sight, and then, conduct his graver, according to the risings or cavities of the muscles, or folds, widening the strokes in the light, and contracting them in the shades; as also at the extremity of the outlines, to which he ought to conduct the cuts of the graver, that the figures or objects represented, may not appear as if they were gnawn; and lightening his hand, that the outlines may be perfectly found, without appearing cut or slit; and, although his strokes necessarily break off where a muscle begins, yet they ought always to have a certain connection with each other, so that the first stroke should often serve to make the second, because this will shew the freedom of the graver.

If hair be the subject, let the engraver begin his work by making the outlines of the principal locks, and sketch them out in a careless manner, which may be finished, at leisure, with finer and thinner strokes to the very extremities.

The engraver must avoid making very acute angles, especially in representing flesh, when he crosses the first strokes with the second, because it will form a very disagreeable piece of tabby-like lattice-work, except in the representation of some clouds in tempests, the waves of the sea, and in representations of skins of hairy animals, and leaves of trees; so that the medium between square and acute seems to be the best and most agreeable to the eye. He that would represent sculpture must remember, that, as statues, &c. are most commonly made of white marble or stone, whose colour does not produce such dark shades as other matters do, have no black to their eyes, nor hair of the head, and beard flying in the air. If the engraver would preserve an equality and harmony in his works, he should always sketch out the principal objects of his piece before any part of them are finished.

The instruments necessary for this sort of engraving are, besides a graver, a cushion or sand-bag, made of leather,



leather, to lay the plate on, in order to give it the necessary turns and motions; a burnisher made of iron or steel, round at one end, and usually flattish at the other, to rub out slips and failures, soften the strokes, &c. a scraper, to pare off the surface, on occasion; and a rubber of a black hat, or cloth rolled up, to fill up the strokes, that they may appear the more visible.

ENGRAVING on *precious Stones*, is the representing of figures, or devices, in relievo, or indented, on divers kinds of hard polished stones.

In this branch of engraving, they make use either of the diamond or emery. The diamond, which is the hardest and most perfect of all precious stones, is only cut by itself, or with its own matter. See DIAMOND.

As to rubies, emeralds, hyacinths, amethysts, garnets, agats, and other of the softer stones, they are cut on a leaden wheel, moistened with emery and water, and polished with tripoli, on a pewter wheel. Lapis lazuli, opal, &c. are polished on a wooden wheel.

To fashion and engrave vases of agat, crystal, lapis lazuli, or the like, they have a kind of lathe, like that of the pewterers, excepting, that whereas the latter is to hold the vessels which are to be wrought with proper tools; the former generally holds the tools, which are turned by a wheel, and the vessel held to them to be cut and engraved, either in relievo or otherwise, remembering, from time to time, to moisten the tools with diamond-dust and oil, or at least emery and water.

To engrave figures or devices on any of these stones, when polished, such as medals, seals, &c. they use an iron wheel, the two ends of whose axes are received within two pieces of iron placed upright, as in the turner's lathe, to be brought closer or set apart at pleasure. At one end of one of the axes are fitted the proper tools, being kept tight by a screw. Lastly, the wheel is turned by the foot, and the stone applied by the hand to the tool; and thus shifted and conducted, as occasion requires.

The tools are generally of iron, sometimes of brass. As to their form, it is various, but generally bears some resemblance to chissels, gouges, &c. some have small round heads like buttons, others like ferrels, to take the pieces out; others flat, &c. These tools are not applied directly against the stone, but, as it were, side-wise; thus wearing, and, as it were, grinding off the substance; and still, whether it be figures, or letters, or characters, the manner of application is the same. The tools, as above observed, are to be frequently moistened with diamond dust, and oil of olives. When the stone is engraven, they polish it on a wheel of brushes, made of hogs bristles, with tripoli. For the larger and less delicate works, they have copper or pewter tools on purpose to polish the ground, or plain parts, with tripoli, &c. which they apply after the same manner as those wherewith the graving is performed.

ENGRAVING on *Steel*, is chiefly employed in cutting punches for coins, medals, &c.

The methods of engraving, with the instruments, &c. are the same for coins, as for medals and counters: all the difference consists in their greater or less relievo; the relievo of coins being much less considerable than that of medals; and that of counters still less than that of coins.

The engraver in steel usually begins with punches, or punchions, which are in relievo, and serve for making the creux, or cavities of the matrices and dies; though sometimes he begins immediately with the creux; but it is only when the intended work is to be cut very shallow. The first thing is to design his figures; then he moulds them in white wax, of the size and depth required; and from this wax he graves his punch.

This punch is a piece of steel, or at least of iron and steel mixed; on which, before they temper or harden it, the intended figure, whether a head or a reverse, is cut or carved in relievo. The instruments used in this graving in relievo, which are much the same as those wherewith the finishing of the work in creux is effected, are of steel. The principal are gravers of divers kinds, chissels, flatters, &c. When the punch is finished, they give it a very high temper, that it may

the better bear the blows of the hammer wherewith it is struck, to give the impression to the matrice.

What they call *matrice*, or *matrix*, is a piece of good steel of a cubick form, called also a *diè*, whereon the relievo of the punch is struck in creux. It is called *matrix*, because, in the cavities or indentures thereof, the coins or medals seem formed or generated, as animals are in the matrix of their mother. To soften this steel, that it may more easily take the impressions of the punch, they make it red hot; and, after striking the punch thereon in this state, they proceed to touch up or finish the strokes and lines, where, by reason of their fineness, or the too great relievo, they are any thing defective, with some of the tools above mentioned.

The figure thus finished, they proceed to engrave the rest of the medal, as the mouldings of the border, the engrailed ring, letters, &c. all which, particularly the letters and graining (or engrailment) are performed with little steel punches, well tempered and very sharp; and that, as they sometimes make use of punchions to engrave the creux of the matrix, so, on some occasions, they make use of the creux of the matrix to engrave the relievo of the punch.

To see and judge of the engraving in creux, divers means have been devised to take impressions therefrom as the work proceeds. Sometimes they make use of a composition of common wax, turpentine, and lamp black; which, always retaining its softness, easily takes the impression of the part of the graving it is applied to: but this only serving to shew the work piece-meal, they have had recourse to other ways, to shew the whole figure: the first, by pouring melted lead on a piece of paper, and clapping the matrix thereon: the second, with melted sulphur, managed the same way: and the third, proper only where the graving is shallow, by laying a piece of soft paper on the graving, and over the paper a leaf of lead, when giving two or three blows with a hammer on the lead, the paper takes the impression of the work.

When the matrix is quite finished, they temper it, rub it well with pumice-stone, and clean out the stone again with a hair-brush; and lastly, polish it with oil and emery.

ENHARMONICK, the last of the three species of ancient musick.

ENMANCHE, in heraldry, the division or partition of a shield, where they enter into each other in the form of long triangles.

ENNEADECÆTRIS, in chronology, a period, cycle, or revolution of nineteen solar years.

ENNEAGON, in geometry, a figure consisting of nine angles and as many sides.

ENS, ENTITY, among metaphysicians, implies a thing really existing.

ENS PRIMUM, in chymistry, the efficacious part of any mixed body, whether of the animal, vegetable, or mineral kingdom.

ENSIFORM CARTILAGE, *ensiformis Cartilago*, in anatomy, a cartilage at the tip or extremity of the sternum.

ENSIGN, in military affairs, signifies the colours under which the infantry range themselves.

ENSIGN, also signifies the officer who carries the colours.

ENSIGN, in naval affairs, is a large flag, hoisted on a pole, called the ensign-staff, erected at the stern of a ship.

ENTABLATURE, or ENTABLEMENT, in architecture, which Vitruvius and Vignola call ornament, is that part of an order of a column, which is over the capital, and comprehends the architrave, frize, and cornice. It is also called the trabeation, from *trabs*, a beam. In the Tuscan and Dorick orders, the architrave, frize, and cornice, are all of the same height. In the Ionick, Corinthian, and Composite, the whole entablature being 15 parts, five of these to go to the architrave, four to the frize, and six to the cornice.

ENTABLATURE, in masonry, is the last row of stones on the top of the wall of a building, on which the timber and the covering rest. It often projects beyond the wall, to carry off the rain.

ENTAIL,



**ENTAIL**, in law, or *Fee-tail*, or *Fee-conditional*, is that which is made to us and our heirs with limitation; that is, the heirs of our bodies, &c. And this is either general or special: general is where land is given to a man and the heirs of his body: special is that where a man and his wife are seized of lands to them and the heirs of their bodies.

**ENTEROCELE**, in surgery, is a kind of swelling in which the intestine falls into groin or scrotum.

The proximate cause of an enterocele is the relaxation or extension of the inferior part of the peritonæum in which the intestines are contained. The remote causes are violent efforts and crying, &c. whence it happens that children are very subject thereto. The remedy in such cases, is chiefly by outward application, as trusses and bolsters.

**ENTERO-EPILOCELE**, in surgery, is a kind of rupture, in which the intestines and omentum or caul fall down together into the scrotum.

**ENTERO-EPILOMPHALUS**, in surgery, is a rupture caused by the intestine and caul falling down through the navel.

This is a disorder common to women with child.

**ENTERO-HYDROMPHALUS**, in surgery, is when the tumour is caused by the gut and water swelling out at the navel.

**ENTEROLOGY**, a treatise on the bowels, which generally includes the contents of the three cavities, the head, breast and belly.

**ENTEROMPHALUS**, in surgery, is a rupture caused by the gut bunching out at the navel.

**ENTHUSIASM**, a transport of the mind, whereby it is led to think and imagine things in a sublime, surprising, and yet probable manner.

**ENTHUSIASM**, in a religious sense of the word, implies a transport of the mind, whereby it fancies itself inspired with some revelation, impulse, &c. immediately from heaven.

**ENTHYMEME**, in logick, is a syllogism which is perfect in the mind, but imperfect in the expression; because some one of the propositions is suppressed, as being too clear and common, and easily to be supplied by the understanding of those with whom we converse.

**ENTRAILS**, are properly the bowels or intestines of any animal; figuratively it is applied to the earth, &c.

**ENTRUSION**, or **INTRUSION**, in law, is a violent or unlawful entrance into lands or tenements, being utterly void of a possessor, by him that hath no right thereto.

**ENTRY**, in masonry, is a door, gate, passage, &c. through which we arrive at any place.

**ENTRY**, in law, is properly the taking possession of lands or tenements; it is also used for a writ of possession.

**ENTRY**, in commerce, is when any transaction is set down in some book or other of those which merchants commonly keep. It likewise signifies the duties that are raised upon certain goods imported.

**ENVELOPE**, in fortification, is a mount of earth, sometimes raised in the ditch of a place, and sometimes beyond it, being either in form of a simple parapet, or of a small rampart bordered with a parapet. These envelopes are made when one would only cover weak places with single lines, without any design of advancing towards the field, which cannot be done but by works that require a great deal of breadth, such as horn-works, half-moons, &c. These envelopes are sometimes called fillons, contreguards, conferves, lunettes, &c.

**ENUMERATION**, an account of several things, in which mention is made of every particular article.

**ENUMERATION**, in rhetoric, is a part of peroration, in which the orator, collecting the scattered heads of what has been delivered throughout the whole, makes a brief and artful relation, or recapitulation thereof.

**ENVOY**, a person deputed to negotiate some affair with any foreign prince of state.

**ENURNY**, in heraldry, is applied to a border charged with beasts.

**ENVY**, in ethicks, is defined to be an uneasiness of the mind, caused by the consideration of a good we desire, obtained by one we think less worthy of it than ourselves.

**EPACTS**, in chronology, the excesses of the solar month above the lunar synodical month, or of the solar year above the lunar year of 12 synodical months.

The common lunar year of 12 synodical lunations consists of but 354 days, 8 hours, 48 min. 57 sec. whereas the solar or tropical year consists of 365 days, 5 hours, 48 min. 57 sec. it is plain therefore that the solar year exceeds the lunar by 10 days, 21 hours, 00 min. 19 sec. and in the space of about 33 years, the beginning of the lunar year will have moved through all the variety of seasons, whence it is called the movable lunar year; and this form of the year is at this time used by the Turks and Arabs.

Hence, as the Julian year is 365 days, 6 hours, and the lunar year, as above, only 354 days, 8 hours, 48 min. 57 sec. the annual epact will be 10 days, 21<sup>h</sup> 11' 22"; that is, nearly 11 days. Consequently, the epact of 2 years is 22 days; of 3 years, 33 days; or rather 3; since 30 days is an embolismick, or intercalary month.

Thus, the epact of 4 years is 14 days, and so of the rest; and at the end of every 19th year, the epact becomes 30 or 0; consequently the 20th year the epact is 11 again; and so the cycle of epacts expires with the golden number, or lunar cycle of 19 years, and begins again with the same.

Again, as the new moons are the same, that is, as they fall on the same day every 19 years, so the difference between the lunar and solar years is the same every 19 years, and because the said difference is always to be added to the lunar year, in order to adjust, or make it equal to the solar year, hence the said difference respectively belonging to each year of the moon's cycle is called the epact of the said year, that is, the number to be added to the said year, to make it equal to the solar, the word being formed from the Greek *επαγω*, induco, intercalo.

Upon this mutual respect between the cycle of the moon, and the cycle of the epacts, is founded this rule for finding the epact belonging to any year of the moon's cycle. Multiply the year given of the moon's cycle into 11, and if the product be less than 30, it is the epact sought, if the product be greater than 30, divide it by 30, and the remainder of the dividend is the epact according to the Julian account.

But as a synodical month or space of time contained between the moon's parting from the sun at a conjunction, and returning to him again, is 29 days, 12 hours, 44 min. and 6 sec. it follows, that 235 lunations are made in 6939 days, 16 hours, 43 min. 30 sec. but in 19 Julian years are 6939 days, 18 hours; and, consequently, the new moons, after 19 Julian years, will not return to the same hour of the day, but will happen 1 hour, 16 min. 30 sec. sooner.

And therefore, because the new moons do not return at the same time of the day that they did 19 years before, but in 312 years they will anticipate one day, we must, in order to find the epact according to the Gregorian calendar, make proper allowance for the anticipation since the Nicene council, which was held in 325.

To do this, divide the centuries of the proposed year by 4; let the quotient be multiplied by 43, and the remainder by 17; to the sum of these products add 86, and divide the whole by 25. Let the quotient (neglecting fractions) be subtracted from 11 times the prime or golden number, then will the remainder, rejecting thirties, be the epact required.

To find the epact until the year 1900, the following rule will serve:

Subtract 1 from the prime or golden number, multiply the remainder by 11, and, rejecting thirties as before, the remainder will give the epact.

**EPANORTHOSIS**, in rhetoric, is a figure by which a person corrects, or revokes what he just before alledged, as being too weakly expressed, in order to add something stronger, and more conformable to the passion with which he is agitated. See **CORRECTION**.

**EPARER**, in the manege, signifies the flinging of a horse, or his jerking and striking with his hind legs.

**EPAULE**, in fortification, denotes the shoulder of a bastion, or the place where its face and flank meet,



and form the angle called the angle of the shoulder. See the article **BASTION**.

**EPAULEMENT**, in fortification, a work raised to cover sidewise, is either of earth, gabions, or fascines, loaded with earth. The epaulements of the places of arms for the cavalry, at the entrance of the trenches, are generally of fascines mixed with earth.

**EPAULEMENT**, also denotes a mass of earth, called likewise a square orillon, from its figure, raised to cover the cannon of a cazemate, and faced with a wall.

It is likewise used for any work, thrown up to defend the flank of a post, or other place.

**EPENTHESIS**, in grammar, the interposition or insertion of a letter or syllable in the middle of a word, as alituum, for alitum; relligio, for religio; induperator, for imperator, &c.

**EPHA**, or **ΕΡΗΑΗ**, a dry measure used by the Hebrews, being, according to Dr. Arbuthnot, equal to three pecks and three pints, English measure.

**EPHEMERA**, in medicine, a diary fever, that terminates in the compass of a day.

**EPHEMERA**, the day-fly, in zoology, a genus of flies belonging to the neuroptera order, and so called from their living only one day and a night: they are about the size of the less house-flies, and have two gibbous protuberances on the top of the head, resembling eyes; add to this, that the tail is furnished with hairs, and the antennæ are short.

Of this genus there are several species, distinguished by their different colours, and the number of hairs in their tail; some have two, and others three.

**EPHEMERIDES**, in astronomy and chronology, an appellation given to such books that contain the longitudes and latitudes of the planets, their passages over the meridian, and their declination; their conjunction among themselves, and with the fixed stars; the occultations of the principal fixed stars by the moon; the eclipses of Jupiter's satellites, and, in general, all the calculations which are necessary for a knowledge of the actual state of the heavens, and for facilitating astronomical observations.

**EPHIPPIUM**, in anatomy, the same with the cella turcica, being a part of the os sphenoides. See **SPHENOIDES**.

**EPHOD**, the word is Hebrew, **עֶפְדִּי**; *ephod*, derived from **עָפַד** *aphad*, to cloath, and signifies a sacerdotal garment, in use among the ancient Jews, supposed to have been a kind of linen alb, or surplice; the same with what the Latins call *super-humale*.

It is very hard to say precisely what the *ephod* was; but all agree, that it was an upper garment worn over all the rest, immediately under the pectoral, or breast-plate. Some hold it had sleeves; others deny it. The generality agree that it was very short, though some hold, that it hung down to the feet behind. There were two kinds of ephods. See 1 Sam. ii. 18. and Exod. xxviii. 6, &c.

**EPICERASTICA**, in pharmacy, medicines that soften or obtund the acrimony of the humours.

**EPICHIREMA**, in logic, a method of reasoning, which comprehends the proof of one or both of the premises of a syllogism, before the conclusion is drawn.

**EPICIDIUM**, in ancient poetry, an elegiack poem, spoken during the funeral solemnities of persons of distinction.

**EPICK**, or **HEROICK POEM**, a discourse formed upon a story partly real and partly feigned, representing some one glorious and fortunate action, that is distinguished by a variety of wonderful, yet probable and pleasing events, and delivered in verse by way of narration, in a sublime and flowing stile, to form the manners, and inflame the mind with the love of virtue.

What distinguishes an epick from a dramattick poem, is, its being a narration that comes immediately from the poet, and is not represented as a tragedy by persons introduced for that purpose.

The chief things to be considered in an epick poem are, first, the fable, that is, the form, and artful representation of the action, which is the matter of the poem; and as the action is more or less perfect, so is the fable. The action in an epick poem, as well as in

tragedy, must be one, not all the actions of a person's life; because the mind is better satisfied with the contemplation of a single object that is easily understood, than when it is perplexed with a variety, and lost in confusion. And on this principal action must all the episodes or under-actions so depend, as to become different, yet useful, members of the same body, and contribute to its support. It must likewise be entire, complete in all its parts, or, as Aristotle describes it, have a beginning, a middle, and an end. Nothing should go before, be intermixed with, or follow after this main action, but what is related to it; nor should any single step be omitted in that just and regular process, which it must be supposed to take from its origin to its consummation. The epick action ought also to be great, that it may strike us with awe, and be suitable to the dignity of the princes, heroes, and illustrious persons, who are supposed to be speaking and acting in the poem. It should likewise be interesting, that it may engage our passions and affections; and entire, that the mind may be wholly satisfied. As to its duration, it is not circumscribed within any limited time; but the warmer and more violent the action is, the shorter must be its continuance. Thus the *Iliad*, whose subject is the anger of Achilles, contains only forty-seven days; but the *Æneid*, whose hero is of a quite different character, takes up a much longer time.

The manners and sentiments fall under the same rule as those of tragedy: and as to the diction, it ought to be perspicuous, but at the same time figurative, noble, and sublime. See **TRAGEDY**.

The moderns seem to mistake that part of the epick and tragedy, which contain the wonderful, confounding it with improbable, and using the two words promiscuously. If it was really so, the wonderful would be always faulty; for that is always so which is improbable. The great art is a just temperament and mixture of both, to make it natural and probable. Scarce any of the poets but Virgil had the art, by the preparation of incidents, to manage the probability in all the circumstances of an epick poem. Homer is not altogether so scrupulous and regular in his contrivances: his machines are less just, and all his measures, to save the probability, are less exact. Lastly, the sovereign perfection of an epick poem, in the opinion of Aristotle, consists in the just proportion and perfect connection of all the parts. It is not sufficient that all be grand and magnificent in an epick poem, but all must be just, uniform, and proportionable, in the different parts that compose it.

This is all that can be observed most essential to an epick poem: little need be said about the machinery, which, among the ancient heathens, was the agency of their false gods, and of angels and demons among us Christians: its beauty and magnificence is well known. The dignity of an epick poem would scarce be kept without it, especially since the marvellous depends on it. The versification of epick poetry, among the Greeks and Romans, consist of hexameters, a sort of verse so peculiar to the epick, that when it is used upon other occasions, it is called heroick verse. Our English verse comes nearest to it both in gravity and majesty, but at how great a distance?

An epick or heroick poem is the best and most perfect kind of poetry; it is the greatest work which the soul of man is capable of performing; and here it is the utmost bounds are set to human composition. All the nobleness and the elevation of the most perfect genius can hardly suffice to form such a one as is requisite for an heroick poet: the difficulty of finding together fancy and judgment, heat of imagination and sobriety of reason, precipitation of spirit and solidity of mind, renders this character so very rare: it requires great images, and yet a greater wit to form them. There must be a judgment so solid, a discernment so exquisite, such perfect knowledge of the language in which he writes, such obstinate study, profound meditations, and vast capacity, that scarce whole ages can produce one genius fit for an epick poet: even among the ancients themselves, if we except Homer and Virgil, we shall scarce find one that is truly an epick poet.



**EPICOENE**, in grammar, a term applied to nouns, which, under the same gender and termination, mark indifferently the male and female species.

**EPICUREAN Philosophy**, the doctrine or system of philosophy, maintained by Epicurus and his followers.

Epicurus, one of the greatest philosophers of his age, was an Athenian, born in the third year of the 109th olympiad, 342 years before Christ; he was obliged to Democritus for almost his whole system. This is the source from which the streams which water the gardens of Epicurus flow. The latter is in the wrong, for not confessing his obligations to Democritus, piquing himself upon quoting nothing, and deriving every thing from his own fund. However, it must be owned that he greatly illustrated the doctrines of Democritus. He wrote a great number of books, which are made to amount to above 300. Though none of them are come down to us, no philosopher's opinions are better known than his. We are mostly indebted for them to the poet Lucretius and Diogenes Laertius, not to mention Cicero, in his philosophical works. The learned Gassendus has collected, with great exactness, all that is to be found in ancient writers, concerning the doctrine and person of Epicurus. These are our authorities for the following account of his philosophy, which consisted of three parts, canonical, physical and ethical. The first, as Laertius relates, was about the canons, or rules of judging. The censure which Tully passes upon him, of his despising logick, will hold true only with regard to the logick of the stoicks which he could not approve of. Epicurus was not acquainted with the analytical method of division and argumentation; nor was he so curious in modes and formation as the stoicks: soundness and simplicity of sense, assisted with some natural reflections, was all his art. His search after truth proceeded only by the senses; to the evidence of which he gave so great a certainty, that he considered them as an infallible rule of truth, and termed them the first natural light of mankind; so that by his doctrine objects are precisely what they appear; that the sun, for instance, and the fixed stars, are really no greater than they appear to us.

In the second part of his philosophy, he laid down atoms, space, and gravity, as the first principles of all things. He did not deny the existence of a God, but thought it beneath his majesty to concern himself with human affairs. He held him a blessed immortal Being, having no affairs of his own to take care of, and above meddling with those of others.

As to his ethicks, he made the supreme good of man to consist in pleasure; and consequently, supreme evil, in pain. Nature herself, says he, teaches us this truth, and prompts us from our birth to procure whatever gives us pleasure, and avoid what gives us pain. To this end he proposes a remedy against the sharpness of pain; this was to divert the mind from it by turning our whole attention upon the pleasures we have formerly enjoyed, and those we are in hopes of taking hereafter. This remedy is of no great efficacy; for while the violence of pain, racks, burns, and agonizes, without a moment's intermission, it is hardly possible to stifle it by thinking of past or future pleasures; we cannot silence the voice of nature, at such a time. He held that the wise man must be happy, as long as he is wise; that pain, not depriving him of his wisdom, cannot deprive him of his happiness. Thus was he reduced to affirm himself happy in the midst of the most exquisite torments.

**EPICYCLE**, in the Ptolemaick astronomy, is a little circle whose centre is in the circumference of a greater; or it is a small orb, which, being fixed in the large orb of a planet, is carried along with it, and yet by its own peculiar motion carries the body of the planet round its proper centre. This ancient astronomers ascribed to all the planets, except the sun, in order to solve their phenomena.

**EPICYCLOID**, in geometry, is a curve generated by a point taken in the periphery of a circle, revolving on the periphery of another, either within or without it.

The length of any part of the curve, that any given point in the revolving circle has described from the time it touched the circle it revolved upon, shall be to double

the versed sine of half the arch, which all that time touched the circle at rest, as the sum of the diameters of the circles to the semi-diameter of the resting circle, if the revolving circle move upon the convex side of the resting circle; but, if upon the concave side, as the difference of the diameters to the semi-diameter.

If a parabola move upon another equal to it, its focus will describe a right-line perpendicular to the axis of the parabola at rest, and at a distance from it equal to the distance of the vertex from the focus, and the vertex of the parabola will describe the cissoid of Diocles; and any other point thereof will describe some one of the defective perbolas of Sir Isaac Newton, having a double point in the like point of the parabola at rest.

If in like manner an ellipsis revolve upon another equal and similar to it, the focus will describe a circle, whose centre is in the other focus, and the radius shall be equal to the axes of the ellipsis; and any other point of the plane of the ellipsis shall describe a line of the fourth order. The same may be also said of an hyperbola, revolving upon another equal and similar to it: for one of the foci will describe a circle, having its centre in the other focus; and the radius shall be the principal axis of the hyperbola; and any other point of the hyperbola shall describe a line of the fourth order.

**EPIDEMICK Diseases**, among physicians, imply those diseases which attack a great number of people at the same time.

Boerhaave observes, that though every particular disease, in various epidemical constitutions, appear, to unattentive observers, the same with regard to their names, signs, and consequences in some measure; yet to the judicious, they will appear quite otherwise, so as to require a different administration of the non-naturals, different treatment, and different medicines. This variety, however, in epidemical diseases, is so obscure, that physicians have not yet been able to deduce it from any abuse of non-naturals: and yet there are many circumstances which make it highly probable, that the causes reside in the air, but depend more upon the inexplicable variety of exhalations contained therein, which, by their mixture with the fluids of the body, or their stimulus, injure the human machine, than upon any change in the sensible qualities thereof.

Upon the invasion of any unknown epidemical distemper, the physicians will receive some information with respect to the cure. 1. By reducing the distemper to some more known kind, which it most resembles. 2. By observing its tendency at the vernal and autumnal equinoxes; at which seasons it is generally most prevalent. 3. By attending to the spontaneous phenomena, which precede, accompany, or follow the death or recovery of the patient, and the better or worse state of the disorder. 4. By diligently remarking the benefit or injury received, from whatever the patients are unavoidably obliged to do; and from whatsoever is taken into, or discharged out of the body. 5. By comparing the cases of a great many patients, labouring under the distemper at the same time. 6. By abstaining from all remedies which are dubious, which irritate and induce a considerable change in the humours, and thereby obscure the nature and tendency of the disease.

According to Van Swieten, the origin of epidemick fevers, and we may add of other epidemical disorders, is always from some cause in common to the whole people who inhabit any particular place: thus, for example, when in besieged cities the scantiness of the market obliges all to use an ill course of diet; hence it is, that they have usually the same course and symptoms, in different patients, and therefore require the same method of cure.

**EPIDERMIS**, in anatomy, the cuticle, or scarf skin.

**EPIGASTICK REGION**, in anatomy, a part or subdivision of the abdomen. See the article **ABDOMEN**.

**EPIGLOTTIS**, in anatomy, a small cartilage in the shape of a tongue, covering the orifice of the glottis or wind pipe.

**EPIGRAM**, in poetry, a short poem confined to



one subject, and concluding with some lively ingenious and natural thought, or point.

**EPILEPSY**, in physick, the falling sickness, or an involuntary, preternatural, highly violent, and convulsive concussion of the nervo-membraneous, and consequently of the muscular parts of the whole body, attended with an abolition of the senses.

The cure of this disease, in adult persons is extremely difficult; but the reverse in children. Two scruples of the powder of wild valerian root mixed with one scruple of native cinnabar, finely powdered, and given morning and evening, is esteemed an excellent medicine. Dr. Cheyne says, a milk diet will cure the most inveterate epilepsy.

**EPILOGUE**, in oratory, implies the end or conclusion of a discourse.

**EPILOGUE**, in dramatick poetry, signifies a speech addressed to the audience after the play is over, generally containing some reflections on certain incidents in the play, especially those in the person who speaks it.

**EPINICION**, in the Greek and Latin poetry, denotes a poem or composition on occasion of a victory obtained. It also signifies a rejoicing, or festival, on account of a victory.

**EPIPHANY**, a Christian festival, otherwise called the Manifestation of Christ to the Gentiles, observed on the sixth of January, in honour of the appearance of our Saviour to the three magi, or wise, who came to adore him and bring him presents.

**EPIPHONEMA**, in rhetorick, a sententious exclamation, containing a lively remark placed at the end of a discourse or narration.

Such is that of Virgil.

*Fas omne abruptit, Polydorum obtruncat, & auro  
Vi potitur. Quid non mortalia pectora cogis  
Auri sacra fames?*

And that of Lucretius, lib. i.

*Tantum religio potuit suadere malorum!*

**EPIPHORA**, in medicine, a preternatural defluction, when they continually discharge a sharp serous humour, which excoriates the cheeks.

**EPIPHYLLOSPERMOUS**, in botany, an epithet applied to those plants which bear their seeds on the back of their leaves; such as fern, maiden-hair, &c.

**EPIPHYSIS**, in anatomy, a bony substance, or, as it were a less bone affixed to a larger, by the intervention of a cartilage.

**EPIPOCELE**, in surgery, is a kind of hernia, in which the omentum falls into the scrotum.

**EPIPLOIS**, a term applied to the arteries and veins, distributed through the substance of the epiploon or caul.

**EPIPLOMPHALON**, an umbilical hernia, proceeding from the epiploon or omentum, falling into the region of the navel.

**EPIPLOON**, in anatomy, the omentum or caul. See the article **OMENTUM**.

**EPISCOPACY**, the quality of episcopal government, or that religious system established in England, so called from its being directed by bishops.

**EPISODE**, in poetry, implies a separate incident, story, or action, invented by the poet, and connected with his principal action, in order to make his work abound with a great diversity of events.

**EPISPASTICK**, in medicine, a topical remedy, which being applied to the external parts of the body, attracts the humours to that part.

**EPISTLE**, denotes the same with a missive letter; but is now chiefly used in speaking of ancient writings, as the epistles of St. Paul, epistles of Cicero, epistles of Pliny, &c.

**EPISTOLARY**, something belonging to an epistle.

**EPISTROPHE**, in rhetorick, a figure wherein that which is supposed of one thing is strongly affirmed of another: thus, "Are they Hebrews? so am I. Are they Israelites? so am I. Are they of the seed of Abraham? so am I," &c.

**EPISTYLE**, in the ancient architecture, a term used by the Greeks for what we call architrave, viz. a massive piece of stone or wood, laid immediately over the capital of a column. See **ARCHITRAVE** and **COLUMN**.

**EPITAPH**, a monumental inscription, which generally contains some elogium of the virtues and good qualities of the deceased, and has a turn of seriousness and gravity adapted to the nature of the subject. The elegance of epitaphs consists in a nervous and expressive brevity; and sometimes are closed with an epigrammatic point. In these compositions no mere epithet, properly so called, should be admitted; for here illustration would impair the strength, and render the sentiment too diffuse and languid. Words that are synonymous are also to be rejected.

**EPISTASIS**, in ancient poetry, the second part of the division of a dramatick poem, or that in which the plot is heightened.

**EPISTASIS**, in medicine, the increase of a disease, or beginning of a paroxysm, particularly in a fever.

**EPITHALAMIUM**, in poetry, a nuptial song, or poetical composition, in praise of the bride and bridegroom, praying for their happiness, prosperity, &c.

**EPITHEM**, in pharmacy, a kind of fomentation, or remedy of a spirituous, aromattick nature, applied externally to the region of the heart, liver, &c. to strengthen and comfort these parts.

**EPITHET**, in poetry and rhetorick, an adjective, expressing some quality of a substantive to which it is joined.

**EPITOME**, an abridgment, or summary of any book.

**EPITRITUS**, in prosody, a foot consisting of three long syllables, and a short one.

**EPOCHA**, in chronology, a continuation of time, beginning from some certain point, as from a root, and proceeding forwards continually.

The doctrine and use of epochas is of a very great extent in chronology: the most remarkable epochas are those of the creation, the olympiads, the building of Rome, and the nativity of our blessed Lord; and most of the valuable historians that are extant have reckoned from one or other of them. The Jewish writers generally made use of the æra of the creation, they having left us a noble and authentick history of occurrences from the beginning of things. The Christian world likewise chiefly reckoned from this æra, till about 500 years after Christ, when the æra of the nativity of our blessed Lord was introduced by Dionysius Exiguus: since that period the epocha of the creation has been less in use, and computations from hence begin now to be laid aside; for the date of the nativity being made familiar to us by the frequent mention of it in civil affairs, it is really more instructive, and gives a clearer notion of the distance of an occurrence from us, to say an event happened so many years before Christ, than to say it happened so many years from the creation; for this reason, the Christian epocha is used by most modern historians. Dionysius began his account from the conception, or incarnation, properly called Lady-day, or the annunciation. Most countries in Europe, however, at present reckon from the first of January; except in the court of Rome, where the epocha of the incarnation still obtains for the date of their bulls. This epocha of Dionysius is charged with a mistake: the common opinion is, that it places our Saviour's nativity a year too late; for that he was born the winter preceding the time prescribed by Dionysius for his conception. But Petavius shews, from Dionysius's own epistles, that the fault lies in Beda, who misrepresented Dionysius, and whose interpretation we follow. For Dionysius began his cycle from the Julian period 1712; but his epocha from the year 1713, wherein the vulgar æra supposes Christ to have been incarnated. The year, therefore, which according to the vulgar epocha is the first year of Christ, according to Dionysius's æra, is the second; so that the present year which we call 1778 should be 1779. Some chronologers, instead of one year, will have the error two.

To this vulgar epocha, as a sure fixed point, chronologers are used to reduce all the other epochas; though there is not one of them but what is controverted; so much uncertainty is there in time.



To reduce the years of one epocha to those of another, a period of years has been invented, which commencing before all the known epochas is, as it were, a common receptacle of them all, called the Julian period. All that remains, therefore, is to add the given year of one epocha to the year of the period. For example, the year of the Julian period wherein Christ was born and circumcised is usually computed to be the year 4713; consequently the first year of the æra of Christ commences in the year 4714 of the Julian period. Hence, if to the year of Christ you add 4713, the sum will be the year of the Julian period corresponding thereto. Suppose we add 4713 to the present year 1778, the sum is 6491, the present year of the Julian period. The epocha of our Lord not only serves for computing the years elapsed since the epocha commenced, but even those before it. Now to find the year of the Julian period, corresponding to a given year before Christ, subtract the given year from 4714, the remainder is the year required.

The epocha of the destruction of Troy, according to Dionysius Halicarnassius and Diodorus Siculus, begins 1181 years before Christ.

The æra of the olympiads or olympick games of use among the Greeks, 776 before Christ.

The epocha urbis conditæ, or of the building of Rome, made use of by the Romans, according to Varro, began 753 years before Christ; according to the fasti capitolini, 752.

The epocha of Nabonasser made use of by the Chaldeans and Egyptians, famous among astronomers, as consisting of Egyptian years, which are disturbed by no intercalation. It begins 747 years before Christ.

The epocha of the death of Alexander the Great, 324.

The epocha of the city of Antioch, 94.

The epocha of the Julian reformation of the calendar, 45.

The epocha Aetiaca, 30.

The Dioclesian epocha, 284 years after Christ.

The epocha of the Hegira, or flight of Mahomet, used by the Turks and Arabs, 622 after Christ.

The epocha of Yfdegird or Persian epocha, 632 after Christ.

N. B. A year, in the epochas of the death of Alexander and Nabonasser, consists but of 365 days; and a year of that of the Hegira is only 354.

EPODE, in lyric poetry, the third or last part of the ode, the ancient ode being divided into strophe, antistrophe, and ode. The epode is now the general name for all kinds of small compositions in lyric verse.

EPOPOEIA, in poetry, the story, fable, or subject treated of in an epick poem. See the article FABLE.

The word is commonly used for the epick poem itself. See the article EPICK POEM.

EPULONES, in Roman antiquity, ministers who assisted at the sacrifices, and had the care of the sacred banquet committed to them.

EQUABLE, an appellation given to such motions as always continue the same in degree of velocity, without being either accelerated or retarded.

EQUAL, a term of relation between two or more things of the same magnitude, quantity or quality.

EQUALITY, that agreement between two or more things, whereby they are denominated equal.

The equality of two quantities, in algebra, is denoted by two parallel lines being placed between them; thus,  $4+2=6$ , that is, 4 added to 2 is equal to 6.

EQUANIMITY, in ethicks, denotes that even and calm frame of mind and temper, under good or bad fortune, whereby a man appears to be neither puffed up or overjoyed with prosperity; nor dispirited, soured, or rendered uneasy by adversity.

EQUANT, ÆQUANT, or Circle of EQUALITY, in astronomy, is a circle used in the Ptolemaick system to account for the eccentricity of the planets, &c.

EQUATION, in algebra, a proposition wherein one quantity is declared equal to another, or where one expression of any quantity is declared equal to another expression of the same quantity: as when we say  $\frac{2}{4}=\frac{3}{6}$ ; where  $\frac{2}{4}$  is said to possess one side of the equation, and  $\frac{3}{6}$

the other. The use of equations is for representing more conveniently, and more distinctly, the conditions of problems, when translated out of the common language into that of algebra. If a problem be justly proposed, it ought to have as many independent conditions comprehended in it, expressly or implicitly, as there are unknown quantities to be discovered by them; and the algebraist must carefully search out, consider and distinguish these conditions one from another, before he enters upon the solution of his problem. In order to bring problems to an equation, the algebraist must substitute some letter of the alphabet for the unknown quantity; and if there be more unknown quantities than one, the rest must receive their names from so many conditions of the problem, and if the problem be justly stated and examined, there will still remain a condition at last, which, being translated into the algebraick language, will afford him an equation, the resolution whereof will give the unknown quantity for which the translation was made; and when this unknown quantity is once discovered, the rest will be easily found.

*Example 1.* Three persons, A, B, and C, make a joint contribution, which in the whole amounts to 76 pounds; of this A contributes a certain sum unknown; B contributes as much as A, and 10 pounds more; and C contributes as much as both A and B together: required their several contributions? In this problem there are three unknown quantities, and three conditions for discovering them; first, that the whole contribution amounts to 76 pounds; secondly, that B contributes as much as A, and 10 pounds more: and thirdly, that C contributes as much as A and B together.—These things being premised, put  $x$  for A's contribution; then, since B contributes 10% more than A, put  $x+10$  for B's contribution: lastly, since C contributes as much as A and B together, add  $x$  and  $x+10$  into one sum, which gives  $2x+10$  for C's contribution: thus we have found names for all the unknown quantities, and there remains still one condition unconsidered, viz. that all the contributions added together amounts to 76 pounds. This therefore being translated into the algebraical language, we shall have the following equation,  $4x+20=76$ .

*Example 2.* One begins the world with a certain sum of money, which he improved so well by traffick, that at the year's end he found he had doubled his first stock, except 100 pounds laid out in common expences; and so he continued every year doubling the last year's stock, except 100 pounds a year expended as before; and at the end of three years, found himself just three times as rich as at first: what was his first stock?

Put  $x$  for his first stock, that is, let  $x$  represent the number of pounds he began with; then the double of this is  $2x$ , and therefore at the year's end, he will have  $2x-100$ ; the double of this is  $4x-200$ ; therefore, at the second year's end, he will have  $4x-200-100$ , or  $4x-300$ ; the double of this is  $8x-600$ ; therefore, at the end of the third year, he will have  $8x-600-100$ , or  $8x-700$ : but there still remains one condition, viz. that he had then three times his first stock; this therefore being translated into the algebraick language, we shall have the following equation,  $8x-700=3x$ .

*Example 3.* A certain cistern which would be filled in 12 minutes, by two pipes running into it, would be filled in 20 minutes by one alone: required in what time it would be filled with the other?

Put  $x$  for the time sought wherein the second pipe would fill the cistern; then to find how much of this cistern will be filled in 12 minutes, it will be  $x:1::12:\frac{12}{x}$ , and for the same reason  $\frac{12}{20}$  will be the part filled by the first pipe in the same time, and consequently,  $\frac{12}{x}+\frac{12}{20}$  will be the quantity they will both discharge into the cistern in the same time: Now there remains one more condition, viz. that in this time they ought to fill the cistern entirely; this, therefore, being expressed in the algebraick language, we shall have the following equation, viz.  $\frac{12}{x}+\frac{12}{20}=1$ .

*Solution*



*Solution of EQUATIONS.*—The above instructions will, we presume, be sufficient to instruct the young algebraist in the method of translating problems into the algebraick language; it remains that we now instruct him how to proceed in solving these equations, which may be performed by the following axioms:

*Axiom 1.* Whenever a fraction is to be multiplied by a whole number, it will be sufficient to multiply only the numerator by that number, retaining the denominator the same as before. Thus,  $\frac{4}{5}$  multiplied into 2 gives  $\frac{8}{5}$ , for the same reason that 4 shillings multiplied into 2 give 8 shillings. Thus, also,  $\frac{7x}{12}$  multiplied into 3 gives  $\frac{21x}{12}$ .

*Ax. 2.* But if the whole number, into which the fraction is to be multiplied, be equal to the denominator of the fraction, then throw away the denominator, and the numerator alone will be the product.

Thus, the fraction  $\frac{a}{b}$  multiplied into  $b$  gives  $\frac{ab}{b}$  or  $a$ : Also,  $\frac{2x}{3}$  multiplied into 3 gives  $2x$ ; and  $\frac{21x}{12}$  multiplied into 12 gives  $21x$ .

*Ax. 3.* If the two sides of an equation be multiplied or divided by the same number, the 2 products, or quotients will be equal to each other.

Thus, if  $\frac{2x}{3} + 4 = \frac{7x}{12} + 9$ ; if both sides of the equation be multiplied into 3, we shall have  $2x + 12 = \frac{21x}{12} + 27$ ; and, if again this last equation be multiplied into 12, we shall have  $24x + 144 = 21x + 324$ .

*Ax. 4.* If a quantity be taken from either side of an equation, and placed on the other with a contrary sign, which is commonly called transposition, the two sides will still be equal to each other.

Thus if  $7 + 3 = 10$ , transpose  $+3$ , and you will have  $7 = 10 - 3$ : also, if  $7 - 3 = 4$ , transpose  $-3$ , and you will have  $7 = 4 + 3$ : or if  $24x + 144 = 21x + 324$ , transpose  $21x$ , and you will have  $24x - 21x + 144 = 324$ ; that is,  $3x + 144 = 324$ ; and if again in this last equation you transpose 144, you will have  $3x = 324 - 144 = 180$ . Transposition, therefore, as it is here delivered, is nothing but a general name for adding or subtracting equal quantities from the two sides of an equation; in which case it is no wonder, if the sums of differences still continue equal to each other. As for instance in this equation  $a - b = c$ , transposing  $-b$ , we have  $a = c + b$ : And what is this after all, but adding  $b$  to both sides of the equation? For if  $b$  be added to  $a - b$ , the sum will be  $a$ ; and if  $b$  be added to  $c$ , the sum will be  $c + b$ ; therefore  $a = c + b$ : Again, in the equation  $a + b = c$ , transposing  $+b$ , we have  $a = c - b$ , which is nothing else but subtracting  $b$  from both sides of the equation.

By the help of these axioms, algebraick equations are easily resolved.

1. Thus, in the first example, where  $4x + 20 = 76$ . Transpose 20, by *ax. 4*, and it will be  $4x = 76 - 20 = 56$ . Then divide both sides by 4, according to *ax. 3*, and it will be  $x = 14$  = to A's part of the contribution. Whence B's will be  $x + 10 = 24$ , and C's  $= 2x + 10 = 38$ .

2. In the second example, where  $8x - 700 = 3x$ . Transpose 700, and it will be  $8x = 3x + 700$ ; also transpose  $3x$ , and we shall have  $8x - 3x = 700$ , or  $5x = 700$ ; then divide both sides by 5, and it will be  $x = 140$ , the sum of money he had at the beginning.

3. In example 3d, where  $\frac{12}{x} + \frac{12}{20} = 1$ . Multiply both sides by  $x$ , and it will be  $12 + \frac{12x}{20} = x$ ; and that by 20, which will give  $240 + 12x = 20x$ ; transpose  $12x$ , and it will be  $240 = 20x - 12x$ , or  $240 = 8x$ ; then divide by 8, and we shall have  $x = 30$  minutes, the time wherein the second pipe alone will fill the cistern.

Hitherto we have used but one single letter in every problem for some one unknown quantity in it; and if there were more, the rest received their names from the

conditions of the problem; but in cases of a more complicated nature, where many unknown quantities are linked and entangled into one another, this method will be found very difficult; and therefore, in such cases, the algebraist is allowed to use as many different letters as he has unknown quantities, provided he finds out as many independant equations for discovering their values; for though, in every equation wherein more unknown quantities than one are concerned, they hinder one another from being found out; yet if as many fundamental equations at first be given, as there are unknown quantities, it will not be difficult, in many cases, from these to derive others that are more simple, till at last you come to an equation wherein but one only unknown quantity is concerned, in which case all the rest are said to be exterminated.

*Prob. 1.* What two numbers are those the product of whose multiplication is 144, and the quotient of the greater dividend by the less is 16?

*Solution.* Put  $x$  for the greater number, and  $y$  for the less; and the question, when extracted from words, will stand thus:

If  $xy = 144$ , and  $\frac{x}{y} = 16$ , what are  $x$  and  $y$ ?

The first of these equations wants no preparation, and therefore may be put down thus:

*Equation 1st*,  $xy = 144$ .

The second equation, when prepared according to the nature of the question, will stand thus:

*Equat. 2d*,  $x - 16y = 0$ .

Multiply the first equation by 1, the supposed coefficient of  $x$  in the second, and the equation not being altered by such a multiplication, will be  $xy = 144$ ; multiply also the second equation by  $y$ , which according to the foregoing article, is the coefficient of  $x$  in the first, and you will have  $xy - 16yy = 0$ ; subtract the latter product from the former, and you will have

*Equat. 3d*,  $*16yy = 144$ ; whence by dividing both sides by 16, and extracting the square root,

*Equat. 4th*  $*y = 3$ .

Substitute now 3 instead of  $y$ , or  $3x$  instead of  $xy$ , in the first equation, and you will have  $3x = 144$ , and consequently,

*Equat. 5th*,  $x = 48$ .

So that the numbers at last are found to be 48 and 3; and they will answer the conditions of the question: For  $48 \times 3 = 144$ , and  $\frac{48}{3} = 16$ .

*Equat. 1st*,  $xy = 144$ .

2d,  $x - 16y = 0$ .

3d,  $*16yy = 144$ .

4th,  $*y = 3$ .

5th,  $x = 48$ .

*Prob. 2.* A greyhound, spying a hare at the distance of 50 of his own leaps from him, pursues her with full speed, making 3 leaps for every 4 of the hare's; and, moreover, passing over as much ground in 2 leaps, as the hare did in 3: I demand how many leaps each made during the whole course?

*Solution.* For the number of the dog's leaps, during the whole course  $x$ ; the number of the hare's leaps in the same time,  $y$ : therefore while the dog makes  $x$  leaps, the hare makes  $y$ ; but, according to the problem, while the dog made 3 leaps, the hare made 4; therefore,  $x$  is to  $y$  as 3 to 4; whence, by multiplying extremes and means, we have  $4x = 3y$ : Again, from the hare's form to the end of the course, the dog made  $x - 50$  leaps, and passed over as much ground as the hare did in all her's  $y$ ; but, according to the problem, the dog passed over as much ground in 2 leaps, as the hare did in 3; therefore,  $x - 50$  is to  $y$ , as 2 to 3; whence, again, by multiplying extremes and means, we have  $3x - 150 = 2y$ : The rest of the solution is as follows:

*Equat. 1st*,  $4x - 3y = 0$ .

*Equat. 2d*,  $3x - 2y = 150$ .

Subtract 3 times the first equation from four times the second, and you will have

*Equat. 3d*,  $*y = 600$ .

Put 600 for  $y$  in the first equation, and you will have  $4x - 3y$ , that is,  $4x - 1800 = 0$ , whence,

*Equat. 4th*,  $x = 450$ .

There-



Therefore, the dog made 450 leaps, and the hare 600, during the whole course; and 450 is to 600, as  $\frac{450}{150}$  is to  $\frac{600}{150}$ ; that is, as 3 to 4: Again, from the hare's form to the end of the course, the dog made 400 leaps; and 400 is to 600, as 4 to 6, or as 2 to 3.

*Prob. 3.* It is required to find out two numbers such, that if their difference be multiplied into their sum, the product will be 5; and if the difference of their squares be multiplied into the sum of their squares, the product will be 65?

*Sol.* Put  $x$  for the greater number, and  $y$  for the less; then will their difference be  $x-y$ , their sum  $x+y$ , and the product of their sum and difference multiplied together will be  $x^2-y^2$ ; then will  $x^2-y^2=5$  by the supposition, and  $x^2=5+y^2$ ; square both sides, and you will have  $x^4=25+10y^2+y^4$ ; again, the difference of the squares of the two numbers sought is  $x^2-y^2$ , and the sum of their squares  $x^2+y^2$ , and the product of these two  $x^4-y^4$ ; therefore  $x^4-y^4=65$  by the supposition, and  $x^4=65+y^4$ ; but  $x^4$  was before found equal to  $25+10y^2+y^4$ ; therefore  $25+10y^2+y^4=65+y^4$ ; whence  $y^2=4$ , and  $y=2$ ; substitute now 4 for  $y^2$  in the first fundamental equation, which was  $x^2-y^2=5$ , and you will have  $x^2-4=5$ , and  $x=3$ ; therefore the numbers sought are 3 and 2, which will answer the conditions.

*To bring Geometrical Problems to EQUATIONS.*—In representing lines by numbers we are at liberty in any problem to represent what line we please by unity, provided that in that problem all other lines be represented by proportionable numbers. Thus, if an inch be represented by an unit, a foot must be represented by the number 12; if a foot be represented by an unit, a yard must be represented by the number 3, and so on; but it is not necessary that the standard-line represented by unity should always be expressed: thus when the three sides of a triangle are represented by the numbers 3, 4, and 5 feet, or 3, 4, and 5 yards, &c. provided that all other lines to which these are to be compared be proportionably represented.

As to surfaces, if any number as 10 represents an area, that area must be looked upon as equivalent to 10 equal squares whose sides are such lines as are represented by unity.

Lastly, if any number as 10 represents the content of any solid, that solid content must be looked upon as equivalent to 10 equal cubes whose sides are units. Thus then, if the number 1 represents a line of a foot long, the number 10, when it represents a line, will signify a line 10 feet long; when it represents an area, it will signify 10 square feet, and when it represents a solid, it will signify 10 cubick feet.

*Prob. 1.* It is required, having given  $a$  and  $b$  the two legs of a right-angled triangle, whereof  $a$  is the greater, to find its hypotenuse without the forty-seventh of the first element?

*Solut.* Out of 8 triangles, all similar and equal to the triangle proposed, let 4 right-angled parallelograms be formed and disposed as in the scheme, viz. A K, B L, C M, and D N; (Plate XXX. fig. 6.) then from the uniformity and constitution of the figure we shall have 3 squares, viz. A B C D the greatest, E F G H the middlemost, and K L M the least. It is further evident, that the greatest square exceeds the middlemost by 4 of the triangles abovementioned, and that the middlemost exceeds the least by the other 4 triangles; and consequently that the middlemost square is an arithmetick mean between the greatest and the least. But that side of the greatest square is  $A B=A E+E B=a+b$ ; and the side of the least square is  $K L=E L-E K=a-b$ ; therefore the area of the greatest square is  $a^2+2ab+b^2$ , and the area of the least square is  $a^2-2ab+b^2$ , and an arithmetick mean between these two areas is  $a^2+b^2$ : therefore the area of the middle square is  $a^2+b^2$ : but the middle square is the square of the hypotenuse of the triangle proposed; therefore, if  $a$  and  $b$  be the legs of any right-angled triangle, the square of the hypotenuse will be  $a^2+b^2$ , and the hypotenuse itself will be  $\sqrt{a^2+b^2}$ . Q. E. I.

Note, that by this problem the relation betwixt the hypotenuse and the legs of the right-angled triangle is investigated: otherwise, the two legs being given to

find the hypotenuse, nothing more is required than to draw a right line equal to one of the legs and perpendicular to the other at its extremity, as H A perpendicular to A E, and to join H E.

*Construction of EQUATIONS.* See CONSTRUCTION.

*Exponential EQUATION.* See EXPONENTIAL.

*Annual EQUATION of the mean Motion of the Sun and Moon's Apogee and Nodes.* The annual equation of the sun's mean motion depends upon the eccentricity of the earth's orbit round him, and is  $16\frac{1}{12}$  such parts, of which the mean distance between the sun and the earth is 1000; whence some have called it the equation of the centre, which, when greatest, is  $1^\circ 56' 20''$ .

The equation of the moon's mean motion is  $11' 40''$ ; of the apogee,  $20''$ ; and of its node,  $9' 30''$ .

These four annual equations are always mutually proportionable to each other: so that when any of them is at the greatest, the three others will also be greatest; and when one diminishes, the rest diminish in the same ratio. Wherefore the annual equation of the centre of the sun being given, the other three corresponding equations will be given; so that one table of the central equations will serve for all.

*EQUATION of a Curve*, an equation expressing the nature of a curve, the relation between an absciss and a corresponding ordinate, or the relation of their fluxions.

*EQUATION of Time*, in astronomy, the reducing of the apparent, unequal time, or motion of the heavenly bodies to equable or mean time, or motion.

Since the diurnal motion of the earth about its axis is equable, every revolution will be performed in the same time, and therefore all the sidereal days and the hours of those days will be equal. And on the other hand the solar days are all unequal, and that on two accounts, to wit, because of the elliptick figure of the earth's orbit, and because of the obliquity of the ecliptic to the equator.

This will appear as follows: let S (Plate XXX fig. 3.) be the sun, A B a part of the ecliptick, A the centre of the earth, and M D a meridian, whose plane passes through the sun. Now, in the time of one revolution about its axis, let the earth be carried about the sun from A to B, and then the meridian will be in the position  $m d$ , parallel to the former M D. But it is plain the meridian  $m d$  is not yet directed to the sun, nor will, till by its angular motion it has attained the situation  $e f$ , describing the angle  $e B m=B S A$ ; whence it appears, that all the solar days are longer than the time of one revolution or sidereal day.

If the earth revolved in the plane of the equator, and in a circle about the sun, then would the angle A S B, and consequently the angle  $e B m$ , be always of the same quantity; and therefore the time of describing the said angle  $e B m$  would always be equal; and so all the solar days would be equal among themselves. But neither of these two cases have place in nature; for by the earth's theory, founded on the nicest observations, the orbit is an ellipsis; and therefore her annual motion cannot be equable, or the angle A S B described in the same space of time will not be equal; for in the aphelion the velocity of the earth will be less than in the perihelion; therefore also the arch A B will be less; and consequently, the similar arch  $e m$ , and therefore also the time of describing it: whence it appears, that the part of time to be added to the sidereal day, to complete the solar day, is always variable.

The other, and the most considerable part of the equation of time, is that which arises from the plane of the earth's orbit or ecliptick, being inclined to that of the equator or plane of the diurnal motion. To explain which, let  $\varpi \varpi^\circ$  (fig. 5.) be a semicircle of the ecliptick, and  $\varpi H^\circ$  of the equinoctial, S the centre of the sun, and A that of the earth in the third quarter of the ecliptick,  $b f$  the meridian passing through the true sun S, and its apparent place at I in the first quarter of the ecliptick  $\varpi^\circ$ .

Suppose now the motion of the earth in every respect equable; and first, that it set out from  $\varpi$ , and proceeded in the equator in a given time to D, the sun would apparently describe in the same time the arch of the equator  $\varpi I$ . Again, suppose it set out from the same point  $\varpi$ , and spent the same time with the same equable velocity



velocity in the ecliptick, it would arrive at the point A; so that the arch  $\simeq A = \simeq D$ , and  $\simeq I = \simeq C$ ; then it is evident, as the earth revolves about its axis from west to east, the meridian of any place will first arrive at the sun I in the ecliptick, and afterwards at the sun C in the equinoctial; that is, the time of noon by the sun in the ecliptick will be sooner than that noon which would happen by the sun in the equinoctial; and that by the quantity of the arch  $bD$  turned into time.

Now the arch  $bD = BC$  is the difference of the sun's longitude  $\simeq I$ , or  $\simeq C$ , and his right ascension  $\simeq B$ . Draw  $ge$  parallel to  $DC$ , and the angle  $eAf$  will be equal to the angle  $DSb$ , and the arch  $ef$  similar to the arch  $Dh$ ; therefore the time in which the meridian  $bf$  revolves into the situation  $eg$ , is that which is to be added to the ecliptick noon, to equate it with the time of the equinoctial noon, in the first and third quarters of the ecliptick. In the second and fourth quarters, the said equation is to be subtracted, as would easily appear by making the same construction there.

Now, because in different parts of the quadrant this arch  $Dh$  or  $BC$  is of a different length, the equation of time will be a variable quantity; and therefore, since the motion and time measured by the sun in the equinoctial is always equal, there being nothing to make it otherwise, it follows, that the times, that is, the days measured by the sun in the ecliptick, must be always unequal; or, in other words, the solar days are sometimes shorter, sometimes longer, than the equal time measured out in the equinoctial.

The true motion of the earth precedes the mean in the first semicircle of anomaly, and is preceded by the mean in the second: therefore, while the earth is going from the aphelion to the perihelion, or while the sun apparently moves from the apogæum to the perigæum, the apparent time will be before the mean; and in the other semicircle of anomaly it will be after it. The difference of these motions, converted into time, is the equation of time in this respect, and is to be subtracted from the apparent time to gain the mean, or added to the mean to gain the apparent, in the first semicircle of anomaly, and vice versa in the latter.

Now both these parts of the equation of time are calculated by astronomers for every degree of anomaly, and for every degree of the sun's longitude in the ecliptick, and disposed in two several tables, with directions for adding and subtracting, as the case requires: so that at all times the true or equal time may be had. And from thence it appears that the apparent time, or that shewn by the sun, namely, by a sun-dial, is but four days in the whole year the same with the mean or equal time shewn by a good clock or watch, to wit, about April the 4th, June the 6th, August the 20th, and December the 13th. Also, about the 22d of October, the equation is greatest of all in the year, being then about  $16' 1''$ ; clocks being then so much slower than sun-dials.

As the solar days are unequal, the hours must be so of course; and hence it appears, that there is no natural body which can by its motion measure time truly or equally; and the only way to do this is by the artificial contrivance of clocks, watches, clepsydræ, hour-glasses, &c.

**EQUATOR**, in geography, a great circle of the terrestrial globe, equidistant from its poles, and dividing it into two equal hemispheres; one north, and the other south. See the article **GLOBE**.

It passes through the E. and W. points of the horizon, and at the meridian is raised as much above the horizon as is the complement of the latitude of the place. From this circle, the latitude of places, whether N. or S. begin to be reckoned, in degrees of the meridian.

All people living on this circle, called by geographers and navigators the line, have their days and nights constantly equal.

It is in degrees of the equator that the longitude of places are reckoned; and as the natural day is measured by one revolution of the equator, it follows that one hour answers to  $\frac{360}{24} = 15^\circ$ : hence  $1^\circ$  of the equator will contain four minutes of time, 15 minutes of a degree will make a minute of an hour; and, consequently, four seconds answer to one minute of a degree.

**EQUERY**, *Esquier*, in the British customs, an officer of state, under the master of the horse.

**EQUESTRIAN Statue**, the statue of a person mounted on horseback.

**EQUILANGULAR**, in geometry, an epithet given to figures whose angles are all equal: such are a square and an equilateral triangle, &c.

**EQUICRURAL**, in geometry, the same with isosceles. See the article **ISOSCELES**.

**EQUIDIFFERENT NUMBERS**, in arithmetick, are of two kinds, 1. Continually equidifferent is when, in a series of three numbers, there is the same difference between the first and second, as there is between the second and third; as 3, 6, 9. And, 2. Discreetly equidifferent, is when in a series of four numbers or quantities, there is the same difference between the first and second, as there is between the third and fourth: such are 3, 6, 7, 10.

**EQUIDISTANT**, an appellation given to things that are equally distant from another thing to which they have some relation.

**EQUILATERAL TRIANGLE**, that whose three sides are equal.

**EQUILATERAL Hyperbola**, is a species of hyperbola, whose transverse diameter is equal to its parameter; and consequently all the other diameters are equal to the parameters, and its asymptotes always intersect each other at right-angles in the centre.

**EQUILIBRIUM**, in mechanicks, is when the two ends of a lever or balance hang so exactly even and level, that neither doth ascend or descend, but keep in a position parallel to the horizon; which is occasioned by their both being charged with an equal weight.

**EQUIMULTIPLES**, in arithmetick and geometry, are numbers or quantities multiplied by one and the same number or quantity. Hence equimultiples are always in the same ratio to each other, as the simple quantities before multiplication: thus, if 6 and 8 are multiplied by 4, the equimultiples 24 and 32 will be to each other as 6 to 8.

**EQUINOCTIAL**, in astronomy, a great circle of the celestial globe, whose poles are the poles of the world.

It is so called, because whenever the sun comes to this circle, the days and nights are equal all over the globe; being the same with that which the sun seems to describe at the time of the two equinoxes of spring and autumn.

All stars, directly under this circle, have no declination, and always rise due E. and set full W. The hour circles are drawn at right-angles to it, passing through every  $15^\circ$ ; and the parallels to it are called parallels of declination.

**EQUINOCTIAL Colure**. See the article **COLURES**.

**EQUINOCTIAL Dial**. See the article **DIAL**.

**EQUINOCTIAL Hour**. See the article **HOURLY**.

**EQUINOCTIAL Point**, &c. See the article **POINT**, &c.

**EQUINOX**, the time when the sun enters either of the equinoctial points, where the ecliptick intersects the equinoctial. See the preceding article.

It is so called, because when the sun is in these points the days and nights are of an equal length all the world over. As the sun is in one of them, in the spring, viz. March 20, it is called the vernal equinox; and in the other, in autumn, viz. September 23, it is called the autumnal equinox.

*Precession of the EQUINOXES*. See **PRECESSION**.

**EQUIPOLLENCE**, in logick, is when there is an equivalence, or agreement, either as to the nature of things, or as to the grammatical sense of any two propositions; that is, when two propositions signify one and the same thing, though they express it after different manners.

**EQUISETUM**, horsetail, in botany, a genus of plants, of the order of the filices, or ferns, the fructifications of which are disposed on an oblong spike, and are of an orbicular figure, dividing into various angles from the base. The plant itself grows in shady woods, and on the sides of ditches, in several parts of England; and consists of jointed stalks, in some species simple, in others branched, producing setæ, or small divisions,



vifions, of the fame ftructure of the larger ones. It is accounted vulnerary and aftringent, and therefore prefcribed in hæmorrhages, and injuries of the kidneys and bladder.

**EQUITY**, in a general fenfe, the virtue of treating all other men according to common reafon and juftice, or as we would be gladly treated ourfelves, when we underftand aright what is our due.

**EQUITY of Redemption**, in our law, is applied to mortgages, as where money being due on a mortgage, the mortgagee is defirous to bar the mortgager's equity of redemption, that is. his right to redeem the mortgage.

**EQUITY** alfo fignifies the court of chancery, where controverfies are determined according to the exact rules of equity and confcience.

**EQUIVOCAL Terms**, or *Words*, among logicians, are thofe which have a doubtful or double meaning.

**EQUIVOCAL Generation**, the production of plants without feed; insects or animals without parents in the natural way. This kind of generation is now entirely exploded.

**EQUULEUS**, in antiquity, a kind of rack, or engine of torture, ufed for extorting a confeffion.

**EQUULEUS**, in aftronomy, a conftellation of the northern hemifphere, whole ftars in Ptolemy's and Tycho's catalogues are 4; but in Mr. Flamftead's 10.

**ERECT FLOWERS**, fuch as grow upright, without hanging or reclining the head.

**ERECTOR *Clicoris***, in anatomy, is one of the two mufcles that ferve for its erection.

**ERECTOR *Penis***, is one of the two mufcles that ferve for its erection.

**ERICA**, heath, in botany. See **HEATH**.

**ERIDANUS**, the river, in aftronomy, a conftellation of the fouthern hemifphere, whole ftars in Ptolemy's catalogue are 30, in Tycho's 19, and in Mr. Flamftead's 68.

**ERMIN**, in heraldry, is a coat of arms, where the field is argent, powdered with fable.

**EROSION**, among phyficians, implies the effect of acrid or acid humours, which eat into, and deftroy the flefh.

**ERRATA**, a lift of errors or faults committed in printing an impreffion of a book.

**ERRATICK**, wandering, an epithet given by aftronomers to the planets, becaufe they wander or change their fituation. Phyficians alfo call thofe fevers which obferve no regular periods, Erratick fevers.

**ERRHINES**, medicines, which when fnuffed up the nofe occafion fneezing, enliven the fpirits, and caufe a difcharge from the head.

**ERROR**, a falfe opinion, a miftake of the underftanding in giving its affent to what is not true.

Mr. Locke reduces the caufes of error to thefe four; firft, want of proofs; fecondly, want of ability to ufe them; thirdly, want of will to ufe them; and fourthly, wrong meafures of probability.

**ERUCA ROCKET**, in botany, a plant with a white, woody, flender root, and hairy ftalks. The leaves are pinnated and lacinated. The flowers are cruciform and ftriped; and the feeds are roundifh.

The fmell of this plant is ftrong and ungrateful, as is alfo the tafte. It is faid to excite the appetite, and help digeftion; to ftrengthen the ftomach, and to promote urine. It is claffed by Linnæus among the brafficas or cabbages.

**ERUCTATIONS**, in medicine, are the effects of flatulent foods, and the crudities thence arifing. See **FLATULENCY**.

**ERUDITION**, *Eruditio*, denotes an extenfive acquaintance with books, efpecially fuch as treat of the Belles Lettres.

**ERUPTION**, in medicine, a fudden and copious excretion of humours, as pus or blood: it fignifies alfo the fame with exanthema, any breaking-out, as puftules of the plague, fmall-pox, meafles, &c.

**ERVUM**, bitter vetch, in botany, a genus of plants producing papilionaceous flowers. The vexillum plane, roundifh and flightly reflexed. The alæ are obtufe, and fhorter by half than the vexillum; and the carina is fhorter than the alæ, and acuminated. The fruit is

a thick, knotty, obtufe and oblong pod containing four roundifh feeds. The ground feeds of a fpecies of this genus abounds with a diuretick falt, and is therefore recommended for the ftone.

**ERYNGO ROOT**, *Radix Eryngii* in pharmacy, is a very long root, growing to 14 or 16 inches in length, and of the thicknefs of one's finger. Its furface is fomewhat wrinkled, the lines running longitudinally. It confifts of a foft, tender, and flefhy cortical part, and an external one of a hard and woody nature, which eafily feparates from it. It is of a dufky brownifh colour on the outfide, and white within; of a fragrant fmell, and a fweetifh agreeable tafte.

The root of the eryngo is an excellent attenuant; it incides and diffolves the vifcid humours which are apt to clog the vifcera, and opens their obftructions; and hence it is an excellent hepatick, uterine, and nephritic. It promotes urine and the menfes, and is excellent in jaundices, and the beginning of dropfies. It muft be obferved, that the whole virtue of the root is contained in the cortical part, which is of fo tough and fibrous a texture, that it cannot be reduced to the common form of powder, without fuch a previous drying as robs it of the greater part of it. Therefore, if any great effect is expected, it muft be given in a decoction, or candied.

**ERYSIMUM**, liedge muftard, in botany, a genus of plants, the corolla whereof confifts of four oblong, cruciform petals, with a very obtufe point: the fruit is a long, linear, four-cornered pod, confifting of two valves, and divided into two cells: the feeds are numerous, fmall, and roundifh.

This plant is recommended in paralytick and epileptic cafes; it expels poifon, deftroys worms, ftrengthens the ftomach, and cures ulcers of the mouth.

**ERYSIPELAS**, otherwife called St. Anthony's fire, is that fpecies of inflammation, which arifing in the fkin, and its fubjacent fat, fometimes fpreads itfelf very far, and is accompanied with rednefs, heat and pain. The part affected, when preffed with the finger, becomes remarkably white; but, foon after its removal, refumes its former rednefs.

The word is Greek, *ερυσιπελας*, and derived from *ερυθρον*, red, and *πελας*, livid; becaufe of the colours it induces on the affected part.

Though inflammations of this kind generally arife on the arms and legs, yet they fometimes happen on the neck, the head, the foulders, nofe, and other parts. Upon the firft approach of this diforder, the patient is almoft always feized with a fhivering and coldnefs, which are foon fucceeded by a degree of heat, equal to that perceived in burning fevers: for this reafon, it is often called *ignis facer*, both by ancient and modern authors.

Great attention is to be given to that fever which is accompanied with an eryfipelas. For in this, befides the pain, thirft, and reftleffnefs, which the patient fuffers, the puftules on various parts of the body fometimes run into gangrenes.

Wherefore, the firft thing to be done is to draw blood pretty plentifully; and then to purge once or more with gentle catharticks, as infufion of fena with manna, for fuch only are proper in fevers. And indeed there is no acute fever that bears repeated purging better than this, efpecially when the inflammatory tumor has feized the head: for the humour fpreads very faft, and foon gains the neighbouring parts.

But it is dangerous to apply hot fomentations, in order to difcufs the morbidick matter; and much more fo, to repel it with cooling ointments or liniments. But, if the fkin in any part be gangrened, that part is to be fomented with a decoction of bitter herbs, mixed with camphorated fpirit of wine; and afterwards a cataplafm of oatmeal boiled in ftrong beer is to be laid on warm, and to be renewed, as often as is found neceffary.

And to give this caution once for all; not only in acute difeafes, but in feveral chronical, which are attended with puftules that fuppurate, it is fafer and better, unlefs the fkin is the fole feat of the diforder, to encourage the eruption by gentle means, or at leaft to fuffer



suffer it to come forth for some time (that is, as far as the patient can bear the uneasiness) than either to repel or purge off the humour by other outlets. For there is in every viscous humour somewhat peculiar to itself: and, as they generally come forth by way of crisis, how much sooner they may be diminished, yet they are rarely evacuated out of the body, with relief to the sick, by any other passages than those pointed out by nature.

*Mead's Monita & Præcepta.*

**ERYTHRINA, CORAL-TREE**, in botany, a genus of the diadelphia-decandria class of plants, the corolla of which is papilionaceous, and consists of four petals: the fruit is a very long pod, protuberated by the seeds, terminating in a small point, and consisting of one cell: the seeds are kidney-shaped. These plants are best propagated by sowing their seeds in the spring on a hot-bed, and afterwards transplanted singly into pots, and plunged into the bark-bed in the stove.

**ERYTHROIDES**, in anatomy, the first part of the proper tunicks or coats which cover the testicles.

**ERYTHRONIUM**, dog's-tooth violet, in botany, a genus of plants whose flower consists of six oblong lanceolated reflexed petals, spreading open at their base with six filaments topped with oblong erect furrowed antheræ, the fruit is a subglobose capsule, with three cells, including a number of ovate acuminate seeds. The root is recommended against the cholick, epilepsy, and worms; it is also reckoned a provocative to venery. This genus comprehends the *dens canis* of Tournefort.

**ESCALADE, or SCALADE**, in the art of war a furious attack of a wall or a rampart, carried on with ladders to mount by; without proceeding in form, breaking ground, or carrying on regular works to secure the men.

**ESCAPE**, in law, a violent or privy evasion out of some lawful restraint, without being delivered by due course of law.

**ESCAPE-WARRANT**, a process which issues out against a person committed to the King's-bench or Fleet-prisons, who without being duly discharged, takes upon him to go at large.

Upon this warrant, which is obtained on oath, a person may be apprehended on a Sunday.

**ESCHALOT, or SHALLOT**, a species of the onion, much used in cookery. See the article **ONION**.

**ESCHAR**, in surgery, is a crust or hard skin brought over any wound or ulcer, or raised with a red-hot searing iron.

**ESCHAROTICKS**, *Escharotica*, in pharmacy, are such medicines or things as induce an eschar.

**ESCHEAT**, in law, signifies any lands or other profits that fall to a landlord within his manor, by way of forfeiture, or the death of his tenant, dying without an heir general, or special, or leaving his heir under age and unmarried. It is also used for the place or circuit within which the king, or the lord, hath escheats of his tenants.

**ESCHEATOR**, is an officer who takes notice of the king's escheats in the country, and certifies them into the Exchequer.

**ESCHYNOMENOUS PLANTS**. See the article **ÆSCHYNOMENOUS**.

**ESCLATTE**, in heraldry, those divisions in a shield which are not made neatly and in a straight line, but seem to shew, that this irregularity is owing to a thing's being violently broken. It is also applied to broken lances, chevrons, &c.

**ESCORT**, in military affairs, is a body of armed men that attends some person or thing for security, and to defend them from any insult.

**ESCOUADE**, is part of a body of infantry, that answers to what is called a brigade among the cavalry.

**ESCROL**, in heraldry, is a scroll, or long slip of parchment or paper, as it were, on which a motto is placed.

**ESCU**, in heraldry, is the shield or form of the ancient buckler, upon which coats of arms and other devices were drawn. It has different names, according to its different divisions.

**ESCULENT Plants**, are such plants as are fit for food, as turnips, potatoes, cabbages, artichokes, &c.

**ESCUTCHEON, or SCUTCHEON**, in heraldry, is the coat or field on which any arms are borne.

**ESCUTCHEON of Pretence**, that on which a man carries his wife's coat of arms, being an heiress, and having issue by her. It is placed over the coat of the husband, who thereby shews forth his pretensions to her lands.

**ESDRAS**, the name of two apocryphal books, usually bound up with the scriptures. They were always excluded the Jewish canon, and are too absurd to be admitted as canonical by the papists themselves. The first book is chiefly historical, giving an account of the return of the Jews from the Babylonish captivity, and the building of the second temple; the second is written in the prophetic way, pretending to visions and revelations, but such as are extremely ridiculous.

**ESLIRASS**, in law, persons particularly appointed or chosen to impanel juries.

**ESNECY**, in law, a private prerogative allowed to the eldest coparcener, where an estate is descended to daughters for want of an heir male, to choose first, after the estate of inheritance is divided.

**ESPALIERS**, in gardening, are rows of trees planted in gardens, either to enclose particular quarters of a garden, or the whole; the trees are most commonly fruit bearing, as apples, pears, or plumbs, these are trailed flat either to stakes or lattice work, and answer the purposes of breaking the winds from the tender plants, hiding from the eye those crops which appear unsightly, and producing handsome fruit; their distance to be planted may be 10 or 12 feet, but this depends on the sort and the richness of the soil: while the trees are young, it will be sufficient to drive a few stakes into the ground, to which the branches should be trained in an horizontal direction, as they are produced; afterward the espalier should be made for good, and the trees regularly pruned, trained, and fastened to it. Hardy fruit-trees, well managed by this method, are much preferable to those trained up in any other figure, upon several accounts, as these take up but little room in a garden, so as to be hurtful to the plants which grow in the quarters; likewise, the fruit upon these are better tasted than those which grow upon dwarfs, the sun and air having freer access to every part of the tree, whereby the damps arising from the ground is sooner dissipated, which is of singular advantage to fruit trees (as hath been shewn under the article **BLIGHT**.) Also trees against an espalier, by being kept low and the branches fastened, the fruit is not so liable to be blown off by the wind, therefore it must be allowed that espaliers are of considerable use as well as beauty.

**ESPLANADE**, in fortification, the sloping of the parapet of the covert-way towards the campaign.

**ESPOUSALS**, in law, signify a contract or promise made between a man and a woman, to marry each other.

**ESSAY**, a trial or experiment to prove the goodness and quality of a thing, or to know whether any invention will succeed.

**ESSAY**, in literature, a peculiar kind of composition, the characteristic of which is to be free, easy, and natural; not confined to any strict order and method, like a formal system.

**ESSAY-HATCH**, in mining, implies a little trench or hole, which the miners dig in searching for ore.

**ESSENCE**, that which constitutes the particular nature of any thing, and makes it what it is.

**ESSENCE**, in chymistry, signifies the more balsamick part of any natural body separated from the thicker matter, by some chymical process.

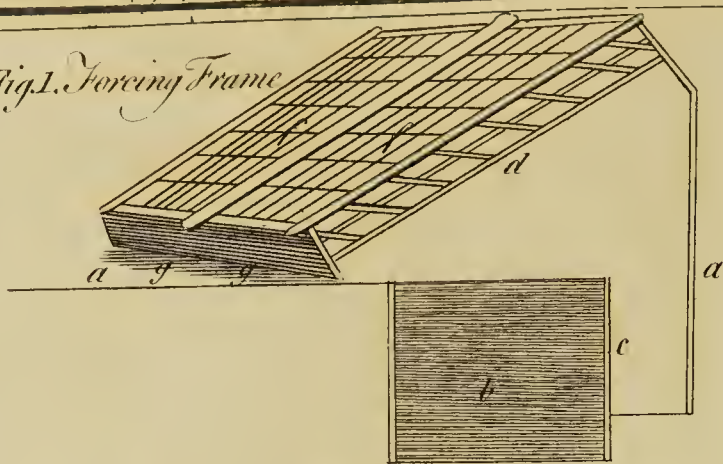
**ESSENI, or ESSENIANS**, in Jewish antiquity, one of the three ancient sects among that people, who outdid the Pharisees in their most rigorous observances. They allowed a future state, but denied a resurrection from the dead. Their way of life was very singular: they did not marry, but adopted the children of others, whom they bred up in the institutions of their sect: they despised riches, and had all things in common; and never changed their cloaths, till they were entirely worn out. When initiated, they were strictly bound







Fig.1. Forcing Frame



Scale of Feet  
0 5 4 3 2 1 1/2

Fig.2.

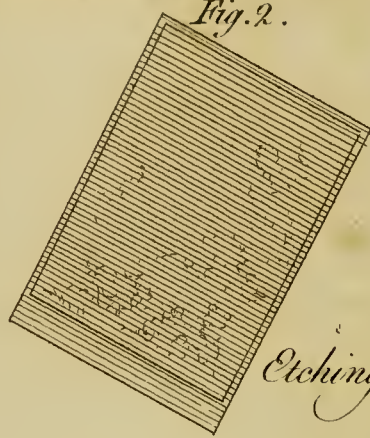


Fig.3.

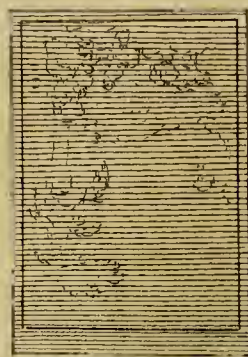
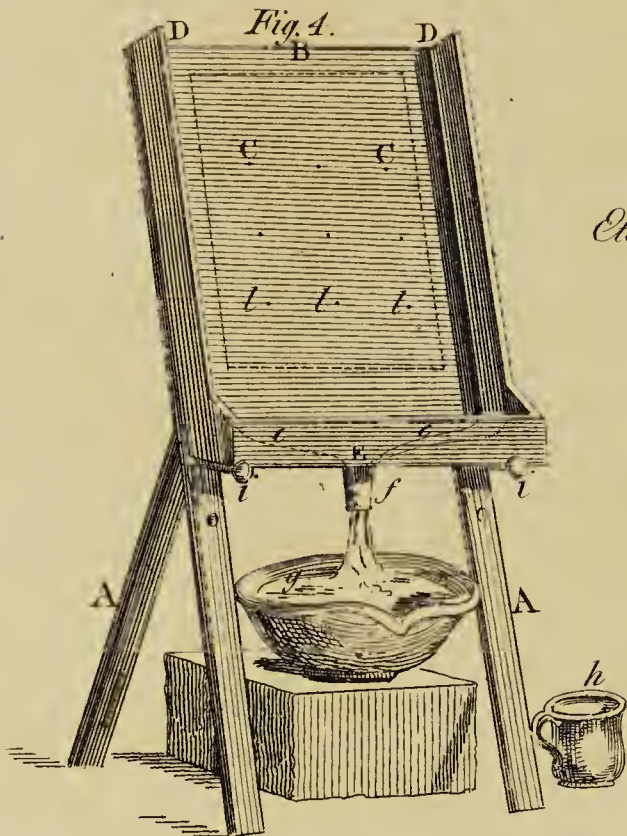


Fig.5.



Etching

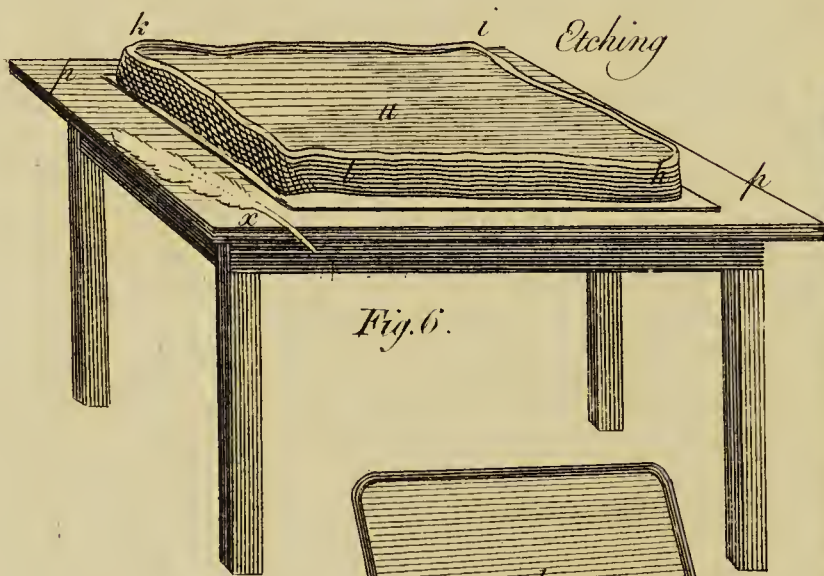


Fig.6.

Fig.7. Etching

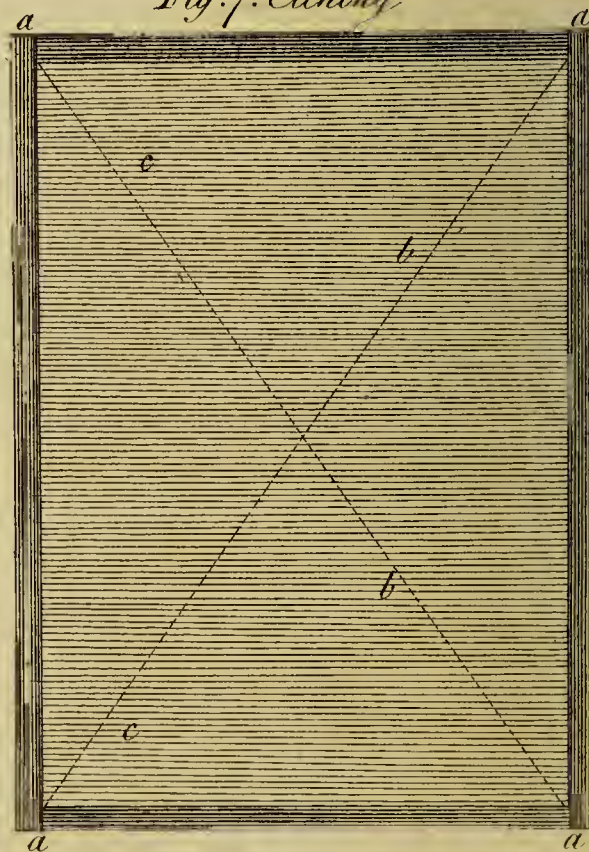
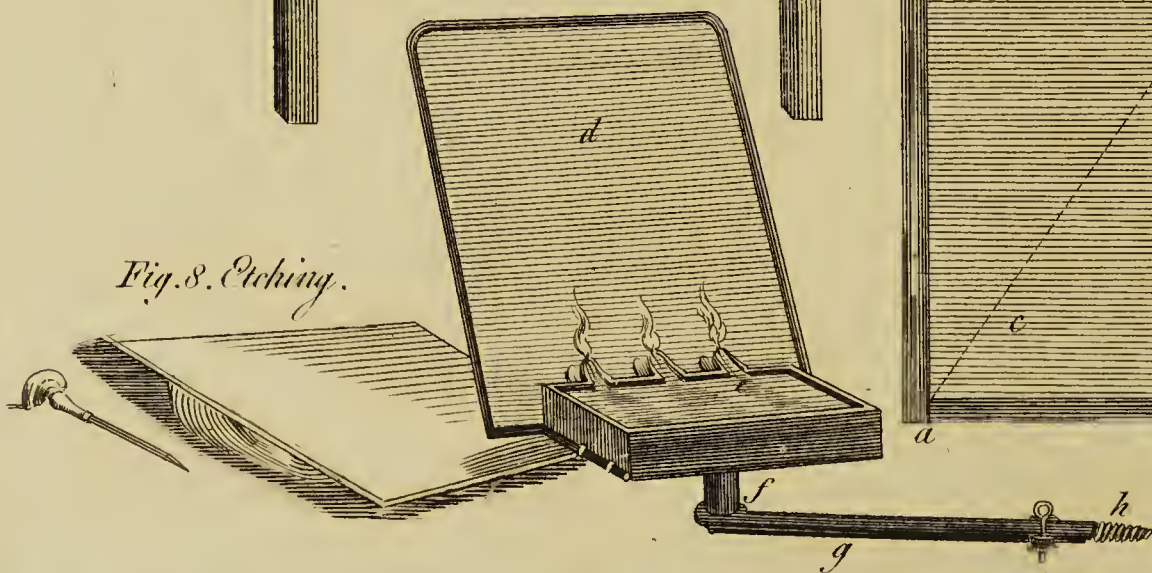


Fig.8. Etching.





not to communicate the mysteries of their sect to others; and if any of their members were found guilty of enormous crimes, they were expelled.

**ESSENTIAL**, that which is necessary to constitute any being, or that which belongs to its essence. Thus it is the essential property of every rectilineal triangle to have the sum of its three angles equal to two right-ones; and of every rectangled triangle to have the square of the hypotenuse equal to the sum of the squares of the other two legs.

**ESSENTIAL Oils**, in chymistry, are such only as are extracted from any body, or plant, when mixed with water, by means of fire.

**ESSENTIAL Salts**, in chymistry, are such salts as shoot into crystals from the juice of any body or plant, when set in a cool place to crystallize.

**ESSOIGN**, or **Essoin**, in law, is the allegation of any excuse from one that is summoned to appear and answer to an action real, or to perform suit to a court baron upon just cause of absence.

**ESSORANT**, in heraldry, represents a bird standing on the ground, with the wings expanded, as if it had been wet and were drying itself.

**ESTATE**, that extent of country which is under the same dominion and government; it likewise signifies the different orders of people in a country, that are assembled to reform the abuses and provide for the exigencies thereof.

**ESTETE**, or **Eteste**, in heraldry, is when an eagle, fish, or other animal has no head, having been either cut clean off, or torn off.

**ESTOPPEL**, in law, is an impediment or bar of an action, arising from a person's own fault, who otherwise might have had this action.

**ESTOVERS**, in law, is the sustenance which a man, committed for felony, has out of his lands or goods, for himself and his family, during his imprisonment.

**ESTRADE**, a publick road or highway; hence *battre l'estrade*, in military affairs, is sending out scouts to discover the enemy, or to get intelligence.

**ESTRAY**, in law, any beast, not wild, that is found within a lordship, and owned by nobody: in which case, being cried according to law in the two next market towns adjacent, and not claimed in a year and a day by the owner, it becomes the property of the lord of the manor or liberty wherein it was found.

**ESTREAT**, in law, a true copy, note, or duplicate of an original writing or record, especially fines, amercements, penalties, &c. set down and imposed in the rolls of a court, to be levied by the bailiff, or other officer.

**ESTREPEMENT**, in law, any spoil made by tenants for life on any lands, &c. to the prejudice of the reversioner: it is also taken to signify the making land barren, by continual ploughing and sowing, and thereby drawing out the heart of the ground without manuring, or rather good husbandry, by which means it is impaired.

It may likewise be applied to the cutting down of trees, or lopping them further than the law allows.

**ESURINE SALTS**, such as are of a corroding, fretting, and eating nature; abounding chiefly in places near the sea-side, and where great quantities of coals are burnt, as appears from the speedy rusting of iron bars in the windows of houses built in such places.

**ETCHING**, a method of engraving on copper, in which the lines or strokes, instead of being cut with a tool or graver, are eaten in with aquafortis.

Etching is done with more ease and expedition than engraving: it requires fewer instruments, and represents most kind of subjects better and more agreeable to nature, as landscapes, ruins, grounds, and all small, faint, loose, remote objects, buildings, &c. See **ENGRAVING**. The method of etching is as follows: choose the copper-plate as directed for engraving, and furnish yourself with a piece of ground, tied up in a bit of thin silk, kept very clean, to be laid upon the plate when both have been warmed; proper needles to hatch with on the ground; a pencil or brush, to wipe away the bits of ground which rise after hatching; a polisher; two or three gravers; a pair of compasses, to measure

distances and draw circles; a ruler, to hatch straight lines; green wax, to make the wall round the edges of the plate, to contain the aquafortis; an oil-stone; a bottle of aquafortis; some red lead, to colour the back-side of the copy; a stift, and a handvice, to hold the plate over the candle.

To make the ground, take three ounces of asphaltum, two ounces of clean rosin, half an ounce of burgundy-pitch, three ounces of black wax, and three ounces of virgin's wax: let all these be melted in a clean earthen pipkin over a slow fire, stirring it all the time with a small stick; if it burn to the bottom, it is spoiled. After the ingredients are well melted, and it boils up, put it into a pan of fair water; and before it be quite cold, take it out, and roll it into small lumps to be kept from the dust: this ground is what others call the varnish. The next thing is to clean the plate to receive the ground; take a piece of liffing, roll it up as big as an egg, tie it very tight, so as to make it a rubber, and having dropped a small quantity of sweet oil, and added a little powder of rotten-stone on the plate, rub it with this ball, till it will almost shew your face. Then wipe it all off with a clean rag, and after that, make it quite dry with another clean rag, and a little fine whiting.

The next thing is to lay on the varnish; to do which aright you must take a hand-vice, and fix it at the middle of one part of the plate, with a piece of paper between the teeth of the hand-vice and the plate, to prevent the marks of the teeth: then laying the plate on a chaffing-dish, with a small charcoal fire in it, till the plate be so hot, that, by spitting on the backside, the wet will fly off: rub the plate with the ground tied up in silk, till it be covered all over; and after that dab the plate with a piece of cotton wrapped up in silk till the ground be quite smooth, keeping the plate a little warm all the time. The varnish being thus smoothed upon the plate, it must be blacked in the following manner: take a thick tallow candle that burns clear, with a short snuff, and having driven two nails into the wall, to let it rest upon, place the plate against the wall with the varnish side downward, and take care not to touch the ground with your fingers: then taking the candle, apply the flame to the varnish as close as possible, without touching the varnish with the snuff of the candle, and guide the flame all over it, till it become perfectly black. After this is done, and the plate dry, the design is traced with a needle through the varnish, and a rim or border of wax is raised round the circumference of the plate; and then the artist has a composition of common varnish and lamp-black, made very thin, wherewith he covers the parts that are not to be bitten, by means of a hair pencil. And he is every now and then covering or uncovering this or that part of the design, as occasion may require; the conduct of the aquafortis being the principal concern, on which the effect of the print very much depends. The operator must be attentive to the ground, that it does not fail in any part, and where it does, to stop up the place with the above composition. The plate is defended from the aquafortis every where, but in the lines or hatches cut through it with the needle, through which the water eats into the copper to the depth required; remembering to keep it stirring with a feather all the while, which done, it is to be poured off again.

Single aquafortis is most commonly used; and if it be too strong, mix it with vinegar, otherwise it will make the work very hard, and sometimes break up the ground: the aquafortis having done its part, the ground is taken off, and the plate washed and dried: after which nothing remains for the artist but to examine the work with his graver, to touch it up, and heighten it where the aquafortis has missed.

And, lastly, it is to be remembered, that a fresh dip of aquafortis is never given, without first washing out the plate in fair water, and drying it at the fire.

Some gravers corrode their plates by placing them on a painter's easel in a reclining position, and pour the aquafortis over the whole surface of the plate, continuing the operation till the design on the plate is sufficiently corroded; the aquafortis continually draining from the plate into a basin placed to receive it.



## Explanation of Plate XXXV.

*Fig. 4.* The manner of corroding, or as the engravers call it, biting the plate, by pouring aquafortis on it. A A B, the easel: B, a board fixed upon the easel for supporting the plate: C C, a plate fitted upon the board B, and supported by the pins *///*: D D, the ledges of the easel: E, a trough for receiving the aquafortis, as it runs off the plate C C: *ee*, the internal shelving part of the trough, directing the aquafortis to the tube *f*, through which it flows into the basin *g*: *h*, a pot for holding the aquafortis: *ii*, pins which support the trough E.

*Fig. 2 and 3.* represent the plate as it appears after it has received several effusions of the aquafortis.

*Fig. 5.* The plate B represented on a larger scale: *l, m, n, o*, parts which require to be less corroded than the rest, and are therefore covered sooner than those which should be stronger. The places at the greatest distance as *l*, are covered first, *m*, the second, and *o*, the last.

*Fig. 6.* Represents the method of corroding the plate in an horizontal position; *p p*, the table: *h, i, k, l*, the border of wax, which confines the aquafortis upon the plate *u*: *l*, the gutter through which the aquafortis, after it has done its office, is poured off the plate: *x*, the feathered part of a quill with which the fortis is continually moved to and fro upon the plate, and the black saline matter, wherever it appears, brushed away. By this means the hatches are cleansed, and the aquafortis exerts its whole force equally on every part of the plate.

*Fig. 7.* A paper-blind: *a, a, a, a*, the frame: *b, b*, pieces of packthread, stretched from one angle of the frame to the other, dividing the blind into four triangles: *c, c*, several sheets of white paper, pasted on the sides of the frame. The use of this blind is to render the light steady and equal on the plate, when the engraver is at work.

*Fig. 8.* A lamp and blind for engraving in the night: *e*, the lamp with three wicks, placed at equal distances behind the blind: *f*, the ferrule or pivot fixed in the iron arm *g*, which supports both the lamp and blind: *h*, a screw, by which the arm is fixed into the wall: *i* the plate placed behind the blind.

**ETERNITY**, an attribute of the Deity, expressing his infinite or endless duration.

**ETHICKS**, or **MORALITY**, the science of manners or duty, which it traces from man's nature and condition, and shews to terminate in his happiness; or, in other words, it is the knowledge of our duty and felicity, or the art of being virtuous and happy.

Moral philosophy inquires, not how man might have been, but how he is constituted; not into what principles or dispositions his actions may be artfully resolved, but from what principles and dispositions they actually flow; not what he may, by education, habit, or foreign influence, come to be or do, but what by his nature, or original frame, he is framed to be and do. From a view, therefore, of man's faculties, appetites and passions, it appears, that the health and perfection of man must be in the supremacy of conscience and reason, and in the subordination of the passions and affections to their authority and direction; and his virtue or goodness must consist in acting agreeably to this order and oeconomy.

**ETHMOIDES**, is an epithet applied to a bone at the root of the nose.

**ETHNOPHRONES**, in church history, hereticks of the seventh century, who, professing Christianity, joined thereto all the ceremonies and follies of paganism.

**ETHOPOEIA**, or **ETHOLOGY**, in rhetoric, a draught, or description, expressing the manners, passions, genius, tempers, aims, &c. of any person.

**ETYMOLOGY**, that part of grammar which explains the derivation of words, in order to arrive at their first and primary signification.

**EVACUANTS**, in medicine, are properly such things as diminish the animal fluids by throwing out some morbid or redundant humour or such as thin,

attenuate, and promote the motion and circulation thereof.

**EVACUATION**, in physick, the art of diminishing, emptying, or attenuating the humours of the body.

**EVANGELIST**, a general name given to those who write, or preach the gospel of Jesus Christ.

The word is of Greek origin, signifying one who publishes glad tidings, or is the messenger of good news.

According to Hooker, evangelists were presbyters of principal sufficiency, whom the apostles sent abroad, and used as agents in ecclesiastical affairs, wheresoever they saw need. The term evangelist, however, is at present confined to the writers of the four gospels.

**EVANID**, a name given by some authors to such colours as are of no long duration, as those in the rainbow, in clouds before and after sun-set, &c.

Evanid colours are also called fantastical and emphatical colours.

**EVANTES**, in antiquity, the priestesses of Bacchus, thus called, by reason, that in celebrating the orgia, they ran about as if distracted, crying, evan, evan, ohé evan. See **BACCHANALIA**.

**EVAPORATION**, in chymistry, the setting a liquor in a gentle heat to discharge its superfluous humidity, reduce it to a proper consistence, or obtain its dry remainder.

**EVATES**, a branch or sect of the Druids, or ancient Celtick philosophers.

**EUBAGES**, an order of priests or philosophers among the ancient Gauls.

**EUCCHARIST**, the Lord's Supper. The word signifies giving of thanks.

**EUCRASY**, in physick, is an agreeable well proportioned mixture of qualities, whereby a body is said to be in good order, or in a good state of health.

**EVECTION**, or *Libration of the Moon*, in astronomy, is an inequality in her motion, by which, at or near the quadratures, she is not in a line drawn through the centre of the earth to the sun, as she is at the syzygies, or conjunction and opposition, but makes an angle with that line of about 2 degrees 51 min.

The motion of the moon about its axis is alone equable, performing its revolution exactly in the same time as it rolls round the earth; and thence it is that it nearly always turns the same face towards us. But this equality, and the unequal motion of the moon in her ellipsis, is the cause why the moon seen from the earth, appears to librate a little upon its axis, sometimes from east to west, and sometimes from west to east; and some parts in the eastern limb of the moon go backwards and forwards a small space, and some that were conspicuous, are hid, and then again appear.

**EVEN Number**, is that which can be divided into two equal parts, as 4, 6, 8, 10, &c.

**EVENLY even Number**, is that which an even number measures by an even one, as 16 is an evenly even number, because 8, an even number, measures it by two, an even number.

**EVENLY odd Number**, is that which an even number measures by an odd one, as 20, which the even number 4 measures by the odd one 5.

**EVERARD'S SLIDING-RULE**. See **SLIDING-RULE**.

**EVERGREENS**, in gardening, a term given to those plants which continue their verdure or foliage all the year; such are pines, firs, cedars, hollies, bays, phillyreas, laurels, with many others.

**EVERLASTING FLOWER**, in botany. See the article **XERANTHEMUM**.

**EVERLASTING Pea**, in botany, a species of **LATHYRUS**.

**EV-SDROPPERS**, in law, persons who stand under the eves, walls, or windows of a house by day or night, to listen after news, and carry it to others, thereby raising strife and contention in the neighbourhood. They are punishable in the court-leet, or quarter-sessions.

**EVICTION**, in law, signifies a recovery of lands, or tenements by law.

**EVIDENCE**. See the article **CERTITUDE**.

**EVIDENCE**, in law, is the testimony a person gives in



in court upon any fact of which he has a personal knowledge.

**EVIL**; in philosophy, &c. is of two kinds, natural and moral.

*Natural EVIL*, according to Mr. Locke, is that which is apt to increase or diminish any pleasure.

*Moral EVIL*, is the disagreement of the voluntary actions of some intelligent with some law, whereby he becomes obnoxious to the punishment of the law-maker.

*King's EVIL*, in medicine, the same with scrophula, or a preternatural obstruction or erosion of the glands. See the article *SCROPHULA*.

**EUMENIDES**, furies, in antiquity. See *FURIES*.

**EUNOMIANS**, in church history, Christian heretics, in the fourth century. They were a branch of Arians, and took their name from Eunomius, bishop of Cyzicus, who was instructed by Actius, in the points which were then controverted in the church, after having at first followed the profession of arms. Eunomius so well answered the designs of his master, and declaimed so vehemently against the divinity of the word, that the people had recourse to the authority of the prince, and had him banished; but the Arians obtained his recall, and elected him bishop of Cyzicus. The manners and doctrines of the Eunomians were the same with those of the Arians.

**EUNUCH**, a castrated person.

**EVOCATI**, in antiquity, were such soldiers, among the Romans, as had served out their legal time, or had received particular marks of favour, as a reward of their valour; whence they were stiled *emeriti* and *beneficarii*. In war time great numbers of those were invited into the army; wherefore they were reckoned almost equal to the centurions. In the field they usually guarded the chief standard, being excused from all the military drudgery and servile employments. *Kennet's Rom. Ant.*

**EVOLUTE CURVES**, are such as are supposed to be evolved or opened, and which, in opening, describe other curves.

**EVOLUTION**, in arithmetick and algebra, implies the extraction of the roots or powers. See *EXTRACTION*.

**EVOLUTION**, in the art of war, the motion made by a body of troops, when they are obliged to change their form and disposition, in order to preserve a post, occupy another, to attack an enemy with more advantage, or to be in a condition of defending themselves the better.

*Naval EVOLUTIONS*, the divers movements performed by fleets or squadrons at sea, in ranging or forming into such lines or positions as may be thought most proper or expedient, either by engaging, defending, or retreating, to the greatest advantage. This term seems to have been first applied to the manœuvres of fleets by P. L'Hôte.

The different expeditions an admiral may be ordered upon, as well as the various circumstances that occur in conducting a fleet, first gave rise to the several lines or orders of which it is formed, whose motions form what is called evolutions.

**EUPHENISM**, in rhetoric, a figure whereby things disagreeable and shocking in themselves, are expressed in terms expressing the opposite quality.

**EUPHONY**, in grammar, an easy smoothness and elegance in expression.

**EUPHORBIVM**, in pharmacy, a gum resin brought us always in loose, smooth, and glossy gold-coloured drops or granules. It is the produce of the *euphorbium antiquorum verum*, which grows to ten or twelve feet high. Its principal use is externally in sinapisms, and plasters applied to the feet, which are intended to stimulate, but not absolutely to raise blisters: for it is observed by Avicenna, that when taken internally in large doses, it has been found to exulcerate the intestines, and bring on death itself, after the most terrible symptoms.

**EUPHRASIA**, eye-bright. See *EYE-BRIGHT*.

**EUROPE**, the least of the four grand divisions of the earth, is situated between the 36<sup>th</sup> and 72<sup>d</sup> deg. north

latitude; and between the 10<sup>th</sup> degrees west long. and 65<sup>th</sup> east long. being about 3000 miles long from north to south, and 2500 miles broad from east to west. It is bounded by the Frozen ocean on the north; by Asia on the east; by the Mediterranean; which separates it from Africa, on the south; and by the Atlantick ocean on the west.

Europe is commonly subdivided into three grand divisions, north, middle, and south. The north or upper division comprehends Russia or Muscovy, Sweden, Denmark, and Norway, and the islands of Britain, Iceland, Greenland, and those of the Baltick. The middle division contains Poland, Germany, and the hereditary dominions of the house of Austria, the Low Countries, or Netherlands, and France. The southern division comprehends Turkey in Europe, the ancient Greece chiefly, Switzerland, Italy, Spain, and Portugal, and the islands of Sicily, Sardinia, Corsica, Majorca, Minorca, Ivica, and those of the Archipelago.

**EURYTHMY**, in architecture, painting, and sculpture, is a certain majesty, elegance, and easiness, appearing in the composition of divers members, or parts of a body, painting, or sculpture, and resulting from the fine proportion of it.

**EUSTILE**, in architecture, a sort of building in which the pillars are placed at the most convenient distance one from another, the intercolumniations being just two diameters and a quarter of the column, except those in the middle of the face, before and behind, which are three diameters distant.

**EUTYCHIANS**, in church history, heretics in the fifth century, who embraced the errors of the monk Eutyches, maintaining that there was only one nature in Jesus Christ. The divine nature, according to them, had so entirely swallowed up the human, that the latter could not be distinguished; insomuch, that Jesus Christ was merely God, and had nothing of humanity but the appearance. This heresy was condemned in a council held at Constantinople in 448, which sentence was confirmed by the general council of Chalcedon in 451.

**EW**, the English name of a female sheep. See the article *SHEEP*.

**EWRY**, in the British customs, an office in the king's household, which has the care of the table linen, of laying the cloth, and serving up water, in silver ewers, after dinner.

**EXACERBATION**, the same with paroxysm. See the article *PAROXYSM*.

**EXACTION**, in law, a wrong done by an officer, or a person in pretended authority, in taking a reward or fee that is not allotted by law.

**EXÆRESIS**, in surgery, is the removing any thing hurtful or superfluous out of the body.

**EXAGGERATION**, in rhetoric, is a kind of hyperbole, whereby things are augmented or amplified, by saying more than the truth, either as to good or bad.

**EXALTATION**, in astrology, is a dignity which a planet acquires in certain signs or parts of the zodiack, which dignity is supposed to give it an extraordinary efficacy and influence.

**EXAMINATION**, in sea affairs, a sort of naval catechism, composed of various questions put by a committee of veteran sea captains to the midshipmen, to discover whether they are sufficiently qualified in the knowledge of their profession to become a lieutenant.

**EXAMINERS**, in chancery, two officers of that court, who examine, upon oath, witnesses produced in causes depending there, by either the complainant or defendant, where the witnesses live in London, or near it. Sometimes parties themselves, by particular order, are examined.

**EXANTHEMA**, in medicine, is a pustule or eruption on the skin, as the measles, small-pox, &c. and is generally attended with a fever, and terminates in a rash.

**EXARCH**, in antiquity, an officer sent by the emperors of the east, into Italy, in quality of vicar, or rather præfect, to defend that part of Italy which still

continued



continued under their obedience, and particularly the city of Ravenna, against the Lombards.

**EXCELLENCY**, a title anciently given to kings and emperors, but now to ambassadors, and other persons, who are not qualified for that of highness, and yet are to be elevated above the other inferior dignities.

**EXCENTRICK**, or **ECCENTRICK**, in geometry, are circles that have not the same centre.

**EXCENTRICK Circle**, in the Ptolemaick system, the very orbit of the planet itself, which it was supposed to describe about the earth. It was also called the deferent. See the article **DEFERENT**.

**EXCENTRICK Circle**, in the new astronomy, a circle described from the centre of the orbit of the planet, with half the axis as a radius.

**EXCENTRICK Equation**, in the old astronomy, is an angle made by a line drawn from the centre of the earth, and another drawn from the centre of the eccentric to the body or place of any planet, the same with the prosthaphæresis; and is equal to the difference (accounted in an arch of the ecliptick) between the sun's or planet's real and apparent place.

**EXCENTRICK Place of a Planet**, is the very point of the orbit, where the circle of inclination, coming from the place of a planet in its orbit, falls thereon with right angles.

*Anomaly of the EXCENTRICK.* See **ANOMALY**.

**EXCENTRICITY**, or **ECCENTRICITY**, in the Ptolemaick astronomy, is that part of the linea apsidum lying between the centre of the earth and of the eccentric; or it is that circle which the sun is supposed to move in about our earth, and which has not the earth exactly for its centre. And this the ancients found must be supposed, because the sun sometimes appears large, and then it is nearest to us; and sometimes smaller, and then it is further off.

**EXCENTRICITY of the Earth**, in the new astronomy, is the distance between the focus and the centre of the earth's elliptick orbit.

Mr. Whiston, in his *Prælect. Astron.* page 90, shews the method of finding this from the apparent motion of the sun, compared with the two extremes of the apsidæ: for since the true velocity of the earth in her aphelion and perihelion is in a reciprocal ratio of her distances from the sun; and that the apparent and angular velocity is in a duplicate ratio of her distances reciprocally; from the apparent difference of these two velocities, the difference of the distances, or the double excentricity, will easily be known. The excentricity of the whole distance is, at a mean, about a 60th part, or more accurately .01786; supposing the distance of the earth from the sun 1000 equal parts.

**Double EXCENTRICITY**, is the distance between the two foci in the ellipsis, which is equal to twice the single excentricity.

**EXCEPTION**, in law, denotes a stop or stay to an action, and is either dilatory or peremptory, in proceedings at common law; but in Chancery it is what the plaintiff alleges against the sufficiency of an answer, &c.

**EXCEPTION to Evidence**, is where a demurrer is offered in any civil cause for the insufficiency of the evidence given, and the court does not agree to it: in such case, the court, upon request, is to seal a bill of exceptions to the evidence, which may be heard on a writ of error.

**EXCEPTIONS in Deeds and Writings**, is the saving a particular thing out of a general one granted by deed, as a room, shop, or cellar out of a house; a field, or timber trees, out of land, &c.

**EXCHANGE**, in a general sense, implies a contract or agreement, whereby one thing is given or exchanged for another.

**EXCHANGE**, in commerce, implies the trade of money, carried on between one place and another, by means of bills of exchange. See **BILL**.

The original traffick of mankind becoming troublesome, necessity led them to the invention of some more easy manner of continuing their commerce, for which end money was thought the most commodious medium, and consequently this was, many ages since, adopted to carry on their trade; and still, for a greater convenience

of foreign trade, they not only made coins of the most valuable metals, but, by degrees, fell into an improvement even of this, and substituted remittances and exchange, by bills, to save the expence and risque which the portage of money from one kingdom to another occasioned. But as commerce varied, so did exchange too, though long ago they were generally reduced in Europe into four, viz. cambio commune, cambio real, cambio ficco, and cambio fictitio.

**Cambio commune**, in England, was that which was constituted by the several kings, who, having received monies in England, would remit the like sum by exchange, to be paid in another kingdom, according to the value of the different coins current in these countries. **Cambio real** was when monies were paid to the exchanger, and bills were drawn without naming the species, but according to the value of the several coins, and was no more than the payment of money in England, with a proviso to be paid the just value in specie, in another country, according to the price agreed on between the exchanger and deliverer, to allow or pay for the exchange of the money and the loss of time. **Cambio ficco**, or dry exchange, is when a merchant has occasion for 500*l.* for a certain time, and would pay interest for it; but the lender being desirous to take more than the statute allows, and yet willing to avoid the penalty, offers the 500*l.* by exchange for Cadiz, to which the merchant agrees; but having no correspondence there, the lender desires him to draw his bill on the said place, payable at double or triple usance, by any feigned person, as the exchange shall then govern, with which the merchant complies; and on receipt of the bill, the banker pays the money and remits the bill to some friend at Cadiz, which, with the exchange and interest, the merchant is to pay his creditor. These expences formerly were very considerable. **Cambio fictitio** is when a merchant hath occasion for goods, but cannot spare money for their payment; and the owner of them, to secure his advantage, and avoid the penalty of the law, acts as the usurer in the former case, and obliges the buyer to defray the expences of re-exchange. &c.

The just and true exchange for monies, that is at this day used both in England and other countries, by bills, is *par pro pari*, or value for value. Thus the English exchange is grounded on the weight and fineness of our own money, and the weight and fineness of those of each other country, according to their several standards, and proportionable to their valuations, which, being truly and justly made, ascertains and reduces the price of exchange to a sum certain for the exchange of monies to any country whatever. As money is the common measure of things between man and man within the realm, so is exchange between merchant and merchant both within and without the realm: the which is properly made by bills, when money is delivered simply here in England, and bills received for the repayment of the same in some other country, either within or without the realm, at a price certain, agreed on between the merchant and the deliverer; for there is not at this day any peculiar or proper money to be found in specie, whereon butland exchanges can be grounded; therefore all foreign coins are called imaginary.

The exchange of all places constantly tends to a certain proportion, and that in the very nature of things. If the course of exchange from Ireland to England is below par, that of Ireland to Holland will be still lower: that is, in a compound ratio of that of Ireland to England, and that of England to Holland: for a Dutch merchant, who can have his specie indirectly from Ireland, by the way of England, will not chuse to pay dearer by having it the direct way. This, we say, ought naturally to be the case; but, however, it is not exactly so: there are always circumstances which vary these things; and the different profit of drawing by one place, or of drawing by another, constitutes the particular art and dexterity of the foreign bankers. This is what in a great measure constitutes what is called arbitration in exchanges, which is defined to be a truck, which two bankers mutually make of their bills upon different parts,



parts, at a conditional price, and course of exchange. This is the most beneficial, as well as the most delicate branch of exchange to be thoroughly informed of.

1. Before any one applies himself to the study of this subject, it is necessary that he should be well skilled in the practical operations, in regard to the reducing of the sterling money of England into the foreign monies of exchange and of account of all places throughout Europe, according to the direct courses of exchange established for these purposes, and vice versa.

2. That he should be acquainted with the methods of converting sterling money into the monies of exchange and of account of all other places of commerce, where-with England has no direct established courses of exchange, but is under the necessity of making use of the intermediate exchanges of other places; together with the nature of the agios, and the manner of converting their bank monies into current, and the reverse. See AGIO.

3. The manner of calculating all the foreign monies of Europe into those of every other distinct country, either according to the direct or intermediate exchange, which makes a much greater variety of cases than those who are not acquainted with this extensive subject can imagine. See COIN.

4. Lastly, it is requisite to understand the general natural causes of the rise and fall of the courses of exchange between nation and nation, or between one trading city and another in the same nation; which depends upon the balance of trade being either in favour of, or against a nation, or trading city.

Another method of considering the arbitration of exchanges, is founded upon comparing the various occasional prices of exchange between nation and nation, in order to discover at all times, whether certain courses continue in an equality of proportion, or how far they deviate therefrom; by which means the advantage to be made by such a comparison of exchanges may be exactly ascertained, for the government of the merchant or remitter, to take his measures accordingly, and not to let the advantageous occasion escape his cognizance. And this must necessarily prove the case, provided a person is not thoroughly acquainted with this branch of exchanging.

EXCHANGE also signifies a place in most considerable trading cities and towns, where the merchants, brokers, agents, bankers, &c. meet at certain times, in order to confer together, and treat of matters relating to mercantile affairs.

EXCHEQUER, in the English jurisprudence, an ancient court of record, in which all causes relating to the revenues and rights of the crown are determined.

*Black Book of the EXCHEQUER*, a book containing a description of the court of England in 1175, and its officers, with their ranks, wages, privileges, perquisites, &c. also the revenues of the crown, both in money and cattle.

EXCISE, a certain duty or impost, charged upon liquors, as beer, ale, cyder, perry, malt, &c. and several other commodities, within the kingdom of Great-Britain, and town of Berwick upon Tweed.

The excise is one of the most considerable branches of the king's revenues. It was formerly farmed out, but is now managed for the king by commissioners in both kingdoms, who receive the whole product of the excise, and pay it into the exchequer. These commissioners are nine in number in England, and four in Scotland. The former have a salary of 1000 *l.* a year, the latter 500 *l.* They are obliged by oath to take no fee or reward, but from the king himself; and from them there lies an appeal to five other commissioners, called commissioners of appeals.

EXCLAMATION, in rhetoric, is an elevation of the voice which expresses the vehemence of any passion, as surprize, joy, admiration, indignation, grief, fear, desire, &c. In English the interjections O! oh! alas! &c. are generally used in exclamation, in Latin, oh! heu! ah! vah! &c.

EXCOMMUNICATION, an ecclesiastical penalty or censure, whereby such persons as are guilty of any notorious crime or offence are separated from the com-

munion of the church, and deprived of all spiritual advantages.

EXCOMMUNICATO CAPIENDO, a writ issued from the chancery upon the bishop's certifying an excommunication.

EXCORIATION, in medicine and surgery, the galling or rubbing off of the cuticle, especially of the parts between the thighs and about the anus.

EXCORTICATION, the same with barking of trees. See the article BARKING.

EXCREMENT, whatever is discharged out of the body of animals, after digestion, or whatever is otherwise superfluous or noxious in them. Urine and the faeces are the gross excrements that are discharged out of the bladder or belly. Physicians likewise call excrement the various humours that are secreted from the blood through the various strainers in the body, and which serve for several uses, such as the saliva, sweat, bile, the pancreatick juice, lymph, the semen, nails, the hair, the horns, and hoofs of animals.

EXCRESCENCE, in surgery, is any superfluous matter that grows preternaturally upon the human or any other body, as wens, warts, or any sort of swelling, particularly a fleshy tumour.

EXCRETION, in medicine, is the act of separating excrements, or excrementitious humours, from the aliments or blood.

EXCRETORY, in anatomy, is a term applied to certain little ducts or vessels which make part of the structure of the glands; being the small tubes through which the humours separated in the glands are discharged out of them into some convenient receptacle, or emunctory.

EXCURSION, in astronomy. See ELONGATION.

EXECUTION, is the acts by which one accomplishes or finishes any thing.

EXECUTION, in common law, is the performance of an act, either a fine, or a judgment; that of a fine is the obtaining actual possession of things contained in the same, which is either by entry into the lands, or by writ. There are two sorts of execution, one final, which makes money of the defendant's goods, or extends to his lands and delivers them to the plaintiff: the other sort of execution is with a quousque, only till the body of the party be taken, in order to satisfy; so that the body is but a pledge for the debt.

*Military EXECUTION*, is a term applied to places where the utmost rigours of war are exercised, for failing to pay contributions, &c.

EXECUTIONE *Facienda*, a writ commanding the execution of a judgment.

EXECUTIONE *Facienda in withernamium*, a writ which lies for taking the cattle of a person, who had formerly conveyed out of the county the cattle of another.

EXECUTOR, in law, is a person appointed by any man, in his last will and testament, to have the disposing of all his substance, according to the contents of the said will. The executor is either particular, as when this or that only is committed to his charge; or he is universal, when every thing is entrusted to him.

EXECUTOR *de son tort*, is he that takes upon him the office of an executor by intrusion, not having been appointed by the testator, nor by the ordinary, to administer.

EXEDRA, in church history, a name sometimes given to the ambo.

EXEDRÆ, in antiquity, a general name for such buildings as were distinct from the main body of the churches, and yet within the limits of the church taken in its largest sense.

EXEMPLIFICATION OF LETTERS PATENT, a transcript or duplicate of them, made from the inrollment thereof, and sealed with the great seal.

EXEMPTION, in law, a privilege to be free from some service or appearance.

EXERCISE, is such an agitation of the body as produces salutary effects in the animal œconomy.

Exercise, Dr. Cheyne observes, is indispensably necessary to preserve the body in due plight; without exercise the juices will thicken, the nerves relax, the joints stiffen; and, on these disorders, chronic diseases and a



crazy old age will ensue. The body may be considered as a system of tubes and glands admirably adapted throughout, as a proper engine for the soul to work with. Exercise ferments the humours, casts them into their proper channel, throws off redundancies, and helps nature in those secret distributions without which the body cannot subsist in its vigour, nor the soul act with clearfulness. Had not exercise been absolutely necessary for our well-being, nature would not have given such an activity to the limbs of the body, and such a pliancy to every part, as necessarily produce those compressions, extensions, dilatations, and all other kinds of motions necessary for the preservation of such a system of tubes and glands. And, that we might not want inducements to such an exercise of the body, riches and honour, even food and raiment, are not to be come at, without the toil of the hands, and sweat of the brow.

He further observes, that those organs of the body which are most used, always become the strongest. Thus the legs, feet, and thighs of chairmen, the arms and hands of watermen, the backs and shoulders of porters, grow thick and strong by use. Of all the kinds of exercise there is none which conduces so much to the health, and is every way accommodated to the body, as that of riding, which is less laborious and expensive of spirits than any other. Dr. Sydenham is very lavish in its praises. Dr. Mead too recommends it in the conclusion of his *Monita & Præcepta*.

EXERCISE, in military affairs, implies the drawing up a body of soldiers, and making them perform the several motions, military evolutions, and the proper management of their arms, that they may be expert in the several manœuvres when they engage an enemy.

EXERCISE, is also used to signify the particulars learned by young gentlemen in the academies and riding-schools, such as riding, fencing, &c.

EXFOLIATION, a term used by surgeons for the scaling of a bone, or its rising and separating into thin laminæ or scales.

EXFOLIATIVE-TREPAN, one for raising the flakes or scales of a bone, one after another.

EX GRAVI QUERELA, in law, is a writ, that lies for the person to whom any lands or tenements in fee are devised by will, and the heir of the devisor enters thereon, and detains them from the devisee. Also, where a person devises such lands to another in tail with the remainder over in fee: here if the tenant in tail enter, and is seized by force of the intail and afterwards he dies without issue, the person in remainder, or reversion, may bring this writ to execute the devise. See *DEVISE*.

EXHALATION, a general term for all effluvia or steams raised from the surface of the earth, in form of vapour. Some, indeed, distinguish exhalations from vapours; expressing by the former, all steams emitted from solid bodies, as earth, fire, sulphur, salts, minerals, &c. and by the latter, the steams raised from water, and other fluids. Exhalations, therefore, according to them, are dry, subtile corpuscles, or effluvia, which are loosened and freed from hard earthy bodies, either by the heat of the sun, the agitation of the air, or the like causes; and being blended in the atmosphere with the moist vapours, help to constitute or form clouds and meteors. See *CLOUD*, &c.

EXHAUSTED RECEIVER, a glass, or other vessel, out of which the air has been drawn by means of an air-pump.

EXHAUSTIONS, in mathematicks, a method in frequent use among the ancient mathematicians, as Euclid, Archimedes, &c. that proves the equality of two magnitudes, by a deduction ad absurdum, in supposing that, if one be greater, or less than the other, there would follow an absurdity.

This is founded upon what Euclid saith in his tenth book; viz. "That those quantities, whose difference is less than any assignable one, are equal." For if they were unequal, be the difference never so small, yet, it may be so multiplied, as to become greater than either of them: if not so, then it is really nothing.

On this foundation they demonstrate, that if a regular polygon of infinite sides be inscribed in, or circum-

scribed about a circle; the space that is the difference between the circle and the polygon will, by degrees, be quite exhausted, and the circle be equal to the polygon.

EXHIBITION, a benefaction settled for the benefit of scholars in the universities, that are not on the foundation.

EXHIBITION was anciently an allowance for meat and drink, such as the religious appropriators made to the poor depending vicar.

EXHIBITION also implies a collection of pieces of painting, sculpture, &c. exposed to publick view.

EXHORTATION, in rhetorick, differs only from suasion, as being more directly addressed to the passions.

EXIGENT, in law, a writ which lies where the defendant in a personal action cannot be found, nor any effects of his within the country, by which he may be attached or distrained.

EXIGENTERS, four officers in the court of Common-Pleas, who make all exigents and proclamations in all actions where process of outlawry lies.

EXILIUM, in law, signifies a spoiling; but seems to be restrained to the injury done to tenants by altering their tenurc, ejecting them, &c.

EXISTENCE, that whereby a thing has an actual essence, or is said to exist, or be.

It has been a subject of great dispute, whether external bodies have any existence but in the mind; that is, whether they really exist, or exist in idea only. The former opinion is supported by Mr. Locke, and the latter by Dr. Berkeley. Those who desire to see the arguments brought by those learned authors, we refer to Locke's *Essay on Human Understanding*, and Berkeley's *Principle of Human Knowledge*.

EXIT, *Exitus*, in law, properly signifies issue, or offspring; but is applied to issues, annual rents, and profits of lands.

EXIT, in a theatrical sense, the action of a player in going off the stage, after he has played his part.

EXODIUM, in the ancient Greek drama, one of the four parts or divisions of tragedy, being so much of the piece as included the catastrophe and unravelling of the plot, and answering nearly to our fourth and fifth acts.

EXODUS, a canonical book in the Old Testament, being the second of the Pentateuch, or five books of Moses, containing the history of the departure of the children of Israel from the land of Egypt; together with the many miracles wrought on that occasion.

EX OFFICIO, among lawyers, signifies the power a person has, by virtue of his office, to do certain acts without being applied to.

EXOMPHALUS, in surgery, is a hernia, or kind of rupture, that exhibits a preternatural tumor or protuberance at the navel.

The word is Greek, *ἐξομφαλός*, and derived from *ἐξ*, and *ομφαλός*, the navel.

This rupture is owing to a protrusion of the intestine, or omentum, or both of them, at the navel, and rarely happens to be the subject of an operation; for though the case is common, yet most of them are gradually formed from very small beginnings, and if they do not return into the abdomen upon lying down, in all probability they adhere without any great inconvenience to the patient, until some time or other an inflammation falls upon the intestines, which soon brings on a mortification and death; unless, by great chance, the mortified part separates from the sound one, leaving its extremity to perform the office of an anus: in this emergency, however, I think it advisable to attempt the reduction, if called in at the beginning, though the universal adhesion of the sac and its contents are a great obstacle to the success: the instance in which it is most likely to answer, is, when the rupture is owing to any strain, or sudden jerk, and is attended with those disorders which follow upon the strangulation of a gut.

In this case, having tried all other means in vain, the operation is absolutely necessary; which may be thus performed: make the incision somewhat above the tumor on the left side of the navel, through the membrana adiposa; and then emptying the sac of its water, or mortified omentum, dilate the ring with the same.

crooked



crooked knife, conducted on your finger; after this, return the intestines and omentum into the abdomen, without making any ligature, but of the skin only. *Sharp's Surgery.*

**EXORCISM**, among ecclesiastical writers, signifies the expelling devils from persons possessed, by means of prayer.

**EXORCISTS**, in church-history, an order of men, in the ancient church, whose employment it was to exorcise or cast out devils. See the preceding article.

**EXORDIUM**, in rhetorick, is the preamble or beginning, serving to prepare the audience for the rest of the discourse.

Exordiums are of two kinds, either just and formal, or vehement and abrupt. The last are most suitable on occasions of extraordinary joy, indignation, or the like. All exordiums should be composed with a view to captivate the good will, or attract the attention of the audience.

**EXOSTOSIS**, in surgery, a preternatural eminence or excrescence of a bone, whether attended with an erosion or not.

When an exostosis is attended with no bad symptoms, it is best to let it alone, as the remedy will be worse than the disease.

**EXOTICK**, an appellation denoting a thing to be the produce of foreign countries.

Exotick plants of the hot climates are very numerous, and require the utmost attention of the gardener to make them thrive with us.

**EXPANSION**, among metaphysicians, denotes the idea we have of lasting or persevering distance, all whose parts exist together.

**EXPANSION**, in physiology, the swelling or increase of the bulk of bodies when heated. See **HEAT**.

**EXPECTORANTS**, in pharmacy, are such medicines as promote expectoration, or promote a discharge of whatever may be offensive either to the aspera arteria, or to the lungs.

**EXPECTORATION**, in physick, implies the art of evacuating or bringing up phlegm, or other matter, from the lungs, by coughing, spitting, &c.

**EXPERIENCE**, a kind of knowledge gained by long practice, or by reiterated trials made on any thing, in order to discover its nature or properties.

**EXPERIMENT**, in philosophy, is the trial of the result or effect of the applications and motions of certain natural bodies, in order to discover something of their motions and relations, whereby to ascertain some of their phenomena or causes.

**EXPERIMENTAL Philosophy**, is that philosophy which is founded upon experiments, whereby the moderns have made several useful discoveries.

The great lord Bacon first paved the way for the new philosophy, by setting on foot the making of experiments. His method has been prosecuted with great industry by the royal society, the royal academy at Paris, Sir Isaac Newton, Mr. Boyle, and many others. In effect, the new philosophy is almost altogether experimental. The great advantages which the modern physicks have above the ancient is chiefly owing to our having a great many more experiments, and making more use of them than they. Their way of philosophizing was to begin with the causes of things, and argue to the effects and phenomena. Ours, on the contrary, proceeds from experiments and observations. Not but that the ancients thought as well of the experimental method as the moderns. Plato, Aristotle, Democritus, Epicurus, &c. were great friends to experiments.

**EXPERIMENTUM Crucis**, a leading, capital, or decisive experiment.

**EXPIATION**, a religious act, whereby satisfaction, or atonement, is made for the commission of some crime, the guilt washed away, and the obligation to punishment cancelled.

*Great Day of EXPIATION*, an annual solemnity held by the Jews on the tenth day of the month Tifri, which answers to our September.

**EXPIRATION**, in physick, is that part of respiration whereby the air is expelled, or driven out of the lungs.

**EXPIRATION**, is also applied to the end of some term adjudged or agreed upon. It likewise signifies death.

**EXPIRATION**, in chymistry, is applied to all sorts of evaporation and subtile effluvia, that go off into the air.

**EXPLOSION**, is properly applied to the going off of gunpowder, and the report made thereby; but it is frequently used to express such sudden actions of bodies, as have some resemblance thereto; such as the sudden effervescence, ebullition, and expansion that arise from the mixture of some contrary liquors; as spirit of nitre and spirit of wine; oil of vitriol and oil of turpentine; oil of vitriol and sal ammoniac, &c.

**EXPOLITION**, in rhetorick, is a figure by which any thing is explained, by different or synonymous terms, the better to make it understood.

**EXPONENT**, in algebra, is a number placed over any power, or involved quantity, to shew to what height the root is raised, in order to contract the work. Thus,  $x^4 = x \times x \times x$ . Here 4 is the exponent of the power  $x$ , and shews that it is involved to the fourth power.

**EXPONENT** of a ratio, is the quotient arising from the division of the antecedent by the consequent.

**EXPONENTIAL CALCULUS**. See **CALCULUS EXPONENTIALIS**.

**EXPONENTIAL Curve**, is that whose nature is expressed by an exponential equation.

**EXPONENTIAL Equation**, is that in which there is an exponential quantity, as  $ax = y$ .

**EXPONENTIAL Quantity**, is a quantity whose power or exponent is a variable or flowing quantity.

**EXPORTATION**, in commerce, the shipping and carrying out of the kingdom, any kind of commodity.

**EXPOSITION**, in matters of literature, implies a commentary, or explanation of some author, or of some obscure passages in his writings.

**EXPOSITOR**, or **EXPOSITORY**, a title given to small dictionaries, serving to explain the hard words in a language.

**EX POST FACTO**, in law, something done after another: thus, an estate granted may be good by matter ex post facto, that was not so at first, as in case of election.

**EXPOSTULATION**, in rhetorick, a warm address to a person, who has done another an injury, representing the wrong in the strongest terms, and demanding redress.

**EXPOSURE**, or **EXPOSITION**, in gardening, is the aspect or situation of a garden, or wall, with respect to the sun or winds: they are, therefore, as various as the points of the compass; being either direct, as east, west, north, or south; or declining, as south-east, north-west, &c. The gardeners do not give those names to the places where the sun is, but to those whereon he shines. A wall standing to the north, and facing the south, is said to have a south aspect or exposure; and a wall which faces the rising sun is said to have an eastern exposure; and so of the others. If the sun at his rising, and during the first half of the day, continue to shine upon one side of a garden or wall, that is an eastern exposure: that side which the sun shines upon the latter half part of the day has a western exposure. That part where it shines longest in the day, from nine till four, is the south aspect; and that part on which it shines least, has a north exposure.

The eastern and southern exposures are, by common consent of all gardeners, the two principal, and have a considerable advantage above the rest. The eastern, commencing differently at different seasons of the year, and ending about noon, subjects the trees, &c. to the north-east winds, which wither the leaves, blow down the fruit, &c. Yet Mr. Laurence judges the east better than the west wall for all kinds of fruit, because the early rays of the sun sooner take off the cold chilly dews of the night. The western, accounted half an hour after eleven till sun-set, is more backward than an eastern one by eight or ten days; but it has this advantage, that it receives little damage from the frosts, which melt before the sun comes to shine upon the fruit, and fall off



like dew without doing any prejudice : but it is incommoded with the north-west winds in the spring, as also with the autumnal winds, which blow down a deal of fruit. The western exposure is better than the north, which is the worst of all.

**EXPRESS**, something that is determinate and precise, or in such formal terms as leave no room for doubt.

**EXPRESS** also denotes a courier, charged with dispatches.

**EXPRESSION**, in chymistry or pharmacy, denotes the act of expressing the juices or oils of vegetables, which is one of the three ways of obtaining them : the other two being by infusion and decoction.

Oils obtained by means of fire are called essential oils.

**EXPRESSION**, in rhetoric, the elocution, diction, or choice of words in a discourse. Beautiful expression is the natural and true light of our thoughts : it is to this we owe all the excellencies in discourse ; which give a kind of vocal life and spirit. As the principal end of discourse is to be understood, the first thing we should endeavour to obtain, is a richness of expression, or habit of speaking so well as to make our thoughts easily understood.

**EXPRESSION**, in painting, a natural and lively representation of the subject, or of the several objects intended to be shewn.

The expression consists chiefly in representing the human body and all its parts, in the actions suitable to it : in exhibiting in the face the several passions proper to the figures, and observing the motions they impress on the external parts.

The term expression is frequently confounded with that of passion, but they differ in this, that expression is a general term, implying a representation of an object agreeably to its nature and character, and the use or office it is to have in the work ; whereas passion, in painting, denotes a motion of the body, accompanied with certain dispositions or airs of the face, which work an agitation in the soul : so that every passion is an expression, but not every expression a passion.

*The Rules of EXPRESSION.* Expression being a representation of things according to their character, may be considered either with respect to the subject in general, or to the passions peculiar thereto.

First, with respect to the subject, it is to be observed,

1. That all the parts of the composition are to be transformed or reduced to the character of the subject, so as they may conspire to impress the same sentiment, passion or idea.
2. In order to this, if any circumstance occur in history or description, that would avert or take from the idea, it must be suppressed, unless essential to the subject.
3. To this end the history or fable is to be well studied in the authors who describe it, in order to conceive its nature and character truly, and impress it strongly on the imagination, that it may be diffused and carried through all the parts of the subject.
4. A liberty may be taken, to choose favourable incidents, in order to diversify the expression, provided they are not contrary to the principal image of the subject, or the truth of history.
5. The harmony of the whole ought to be particularly regarded, both with respect to the actions and the light and colour.
6. The modes and customs are to be observed, and every thing made conformable to time, place, and quality.
7. The three unities of time, place and action, ought to be observed ; that is, nothing should be represented in the same picture, but what is transacted or passes at the same time, and may be seen at the same view.

Secondly, with respect to the particular passions and affections of the subject, the rules are, 1. That the passions of brutes be few and simple, and have almost all an immediate respect either to self-preservation or the propagation of the species : but in the human kind there is a greater variety, and accordingly more marks and expressions thereof. 2. Children not having the use of reason, act much after the same manner as brutes, and express the motions of their passions directly, and without fear or disguise. 3. Though the passions of the soul may be expressed by the actions of the body, it is in the face they are generally shewn, and particularly in the turn of the eye, and motions of the eye-

brows. 4. There are two ways of lifting up the eye-brows, the one at the middle, which likewise draws up the corners of the mouth, and argues pleasant motions ; the other at the point next the nose, which draws up the middle of the mouth, and is the effect of grief or sadness. 5. The passions are all reducible to joy and sadness, each of which is either simple, or mixed and passionate. 6. Joy causes a dilatation of the parts : the eye-brows rise in the middle ; the eyes half open, and smiling ; the pupil sparkling, and moist ; the nostrils a little open ; the cheeks full ; the corners of the mouth drawn a little upwards ; the lips red ; the complexion lively ; the forehead serene. 7. Passionate joy, proceeding from love, shews the forehead smooth and even, the eye-brows a little elevated on the side the pupil is turned to, the eyes sparkling and open, the head inclined towards the object, the air of the face smiling, and the complexion ruddy. That proceeding from desire shews itself by the body, the arms extending towards the object in uncertain and unquiet motions. 8. Simple sadness is expressed by the body being cast down, the head carelessly hanging aside, the forehead wrinkled, the eye-brows raised to the middle of the forehead, the eyes half shut, and the mouth a little open, the corners downwards, the under lip pointing and drawn back, the nostrils swelled and drawn downwards. That mixed with fear causes the parts to contract and palpitate, the members to tremble and fold up, the visage to be pale and livid, the point of the nostrils elevated, the pupil in the middle of the eye, the mouth opened at the sides, and the under lip drawn back. In that mixed with anger, the motions are more violent, the parts all agitated, the muscles swelled, the pupil wild and sparkling, the point of the eye-brows fixed to the nose, the nostrils open, the lips big and pressed down, the corners of the mouth a little open and foaming, the veins swelled, and the hair erect. That with despair resembles the last, only more excessive and disordered. 9. The hand has a great share in the expression of the sentiments and passions ; the raising of the hands, conjoined, towards heaven, expresses devotion ; wringing the hands, grief ; throwing them towards heaven, admiration ; fainting and dejected hands, amazement and despair : folding hands, idleness ; holding the fingers indented, musing ; holding forth the hands together, yielding and submission ; lifting up the hand and eye to heaven, calling God to witness ; waving the hand from us, prohibition ; extending the right hand to any one, pity, peace, and safety ; scratching the head, thoughtfulness ; laying the hand on the heart, solemn affirmation ; holding up the thumb, approbation ; laying the fore finger on the mouth, bidding silence ; giving with the finger and thumb, a giving sparingly ; and the fore-finger put forth and the rest contracted, to shew and point at, as much as to say, this is he. 10. The sex of the figure is to be regarded ; and man, as he is of a more vigorous and resolute nature, ought to be expressed in all his actions freer and bolder than women, who are to be more reserved and tender. 11. So also as to the age, the different stages whereof incline to different motions both of body and mind. 12. The condition or honours a person is invested with, renders their actions more reserved, and their motions more grave, contrary to the populace, who observe little conduct or restraint, giving themselves up, for the most part, to their passions ; whence their external motions become rude and disorderly.

Lastly, in spirits, all those corruptible things must be retrenched, which served only for the preservation of life, as veins, arteries, &c. only retaining what may serve for the form and beauty of the body. In angels particularly, as symbolical figures, their offices and virtues are to be marked out, without any draught of sensual passions, only appropriating their characters to the functions of their powers, activity and contemplation.

**EXPULSION**, in medicine, the act whereby any thing is forcibly driven out of the place it possesses.

**EXTASY**, a transport which suspends the function of the senses, by the intense contemplation of some extraordinary and supernatural object.



EXTASY, in medicine, a species of catalepsy. when the person perfectly remembers, after the paroxysm is over, the ideas he conceived during the time it lasted.

EXTENSION, in philosophy, one of the common and essential properties of body, or that by which it possesses or takes up some parts of universal space, which is called the space of that body.

EXTENSOR, an epithet applied to several muscles, from their extending or stretching the parts to which they belong.

EXTENT, in law, a writ sent to the sheriff, or some commissioner for valuing lands, tenements, &c.

EXTERIOR POLYGON, in fortification, signifies the distance from one point of a bastion to that of another, and extended, in that manner, all round the work.

EXTERMINATION, the act by which any thing is utterly destroyed.

EXTERMINATION, in algebra. See EQUATION.

EXTERNAL, or EXTERIOR, a term of relation applied to the surface or outside of a body; or that part which appears or presents itself to the eye, touch, &c. in contradiction to internal. See INTERNAL.

EXTERNAL Medicines, the same with local or topical medicines. See the articles TOPICAL and LOCAL.

The senses are also divided into external, being those whereby we perceive ideas, or have the perception of external objects, as seeing, hearing, &c. internal. See SENSE.

EXTERNAL is also used to signify any thing that is without-side a man, or that is not within himself, particularly in his mind, in which sense we may say external objects, &c.

EXTERNAL ANGLES, are the angles on the outside of any right-lined figure, when all the sides are severally produced, and they are all, taken together, equal to four right-angles.

EXTINCTION, in general, denotes the putting out or destroying something, as a fire or flame. Various engines have been contrived for extinguishing accidental fires; for which see the article ENGINE.

EXTINCTION, in chymistry, is when a metal, mineral, &c. after having been heated red hot, is plunged into some fluid; either to soften and temper its acrimony, as tutty in rose-water; or to communicate its virtue to the liquor, as iron or steel to common water, &c.

EXTORTION, in law, an illegal method of wresting any thing from a man, either by force, menace, or authority. It also signifies the exacting of unlawful usury, winning by unlawful games, and taking more than is due under pretence of right.

EXTRACT, in pharmacy, the purer part of vegetable or other natural bodies separated from the more gross parts, and reduced to a thick and moist consistence by evaporation, distillation, &c.

EXTRACT, in literature, signifies something copied, or collected from a book, paper, &c.

EXTRACTION, in chymistry and pharmacy, the operation by which essences, tinctures, &c. are drawn from natural bodies. See the article EXTRACT.

EXTRACTION, in surgery, denotes an operation whereby some foreign matter lodged in the body, contrary to the order of nature, is drawn out of the same by manual application, or the help of instruments. Such is the extraction of a stone, formed in the bladder, or in the kidneys, &c.

For the extraction of bullets, &c. from wounds. See the article GUN-SHOT Wounds.

EXTRACTION of Roots, in arithmetick and algebra, is the unravelling, or, as it were, the unfolding or resolving any proposed power or number into the same parts of which it is composed, or supposed to be made up of. In order to perform which, it will be requisite to consider how those powers are composed, &c.

A square number is that which is equally equal, or which is contained under two equal numbers.

Thus the square number four is composed of two equal numbers 2 and 2, viz.  $2 \times 2 = 4$ .

Or the square number 9 is composed of the 2 equal numbers 3 and 3, viz.  $3 \times 3 = 9$ . According to Euclid. This is, if any number be multiplied into itself, that product is called a square number.

A cube is that number which is equally equally equal, or which is contained under 3 equal numbers. Thus the cube number 8 is composed of 3 equal numbers 2, 2 and 2, viz.  $2 \times 2 \times 2 = 8$ , &c. That is, if any number be multiplied into itself, and that product be multiplied with the same number; the second product is called a cube number.

These two, viz. the square and cube numbers, borrow their names from geometrical extensions, or figures. Thus a root is represented by a line or side, having but one dimension, viz. that of length only.

The square is a plane, or figure, of 2 dimensions, having equal length and breadth. The cube is a solid body of 3 dimensions, having equal length, breadth, and thickness. But beyond these 3 nature does not proceed, as to local extension. That is, the nature of place, or space, does not admit any other ways of extension, than length, breadth, and thickness. Neither is it possible to form or compose any figure or body beyond that of a solid.

And therefore all the superior powers above the cube or third power, as the biquadrate or fourth power, the sursolid or fifth power, &c. are best explained and understood by a rank or series of numbers in geometrical proportion.

For instance, suppose any rank of geometrical proportionals, whose first term and ratio are the same; and to them let there be assigned a series of numbers in arithmetical progression, beginning with an unit or 1, whose common difference is also 1.

Thus  $\left\{ \begin{array}{l} 1. 2. 3. 4. 5. 6. 7 \text{ Indices} \\ 2. 4. 8. 16. 32. 64. 128. \text{ \&c. in geometrical proportion.} \end{array} \right.$

Then are those numbers in continual proportion, produced by a continued multiplication of the first term or root into itself; and those of arithmetical progression, or indices, shew what degree or power each term in the geometrical proportion is of. For example, in this series of geometrical proportionals, 2 is both the first term or root, and common ratio of the series.

Then  $2 \times 2 = 4$  the second term or square.  
And  $2 \times 2 \times 2 = 8$ , or  $4 \times 2 = 8$  the cube or third term.  
Again  $2 \times 2 \times 2 \times 2 = 16$ , or  $8 \times 2 = 16$  the fourth term or biquadrate, and so on for the rest.

Note. this is called involution, viz. when any number is drawn into itself, and afterwards into that product, &c. it is said to be so often involved into itself; and the indices are the exponents of their respective powers so involved.

And, according to these involutions, is formed the following table; wherein the root is only one single figure:

Roots	1	2	3	4	5	6	7	8	9
Squares	1	4	9	16	25	36	49	64	81
Cubes	1	8	27	64	125	216	343	512	729

When any number is proposed to have its root extracted, the first work is to prepare it, by points set over their proper figures, according as the given power, whose root is sought, requires. And this is done by considering the index of the given power, which for the square is 2, the cube 3, &c. Then allow so many figures in the given power for each single figure of the root, as its index denotes, always beginning those points from the place of unity, and proceeding towards the right hand, if the given number be integers; but towards the left hand in decimal parts.

EXTRACTION of the Square Root. Having pointed the given number into two figures, as before directed; then, by the table of powers or otherwise, find the greatest square contained in the first period towards the left hand, setting down its root like a quotient figure in division, and subtract that square out of the given number in the first period: to the remainder bring down the next period of figures for a dividend, and double the root of the next square for a divisor, enquiring how often it may be had in that dividend, when the quotient figure is annexed to the divisor; subtract this result from the dividend, and to the remainder bring down the next period of figures for a new dividend;



dividend; then seek how often the last increased dividend can be had in the new dividend, with the same caution as before; proceed in the same manner from period to period, till the whole work is finished.

But the following examples will better explain this rule than a multitude of words:

*Example 1.* Let it be required to extract the square root out of 572199960721: this resolvend, being pointed as above directed, will stand thus:

572199960721 (756439, the root  
49 = the greatest square in 57.

1. Divisor, 145) 821  
5 725 = 145 × 5
2. Divisor, 1506) 9699  
6 9036 = 1506 × 6
3. Divisor, 15124) 66396  
4 60496 = 15124 × 4
4. Divisor, 151283) 590007  
3 453849 = 151283 × 3
5. Divisor, 1512869) 13615821  
9 13615821 = 1512869 × 9

Proof, 756439 × 756439 = 572199960721, the resolvend.

*Ex. 2.* What is the square root of 1850701,764025?

Operation. 1850701,764025 (1360,405, the root  
1 (required.

$$\begin{array}{r} 23) \quad 85 \\ \underline{3} \quad 69 \\ 266) \quad 1607 \\ \underline{6} \quad 1596 \\ 27204) \quad 1101,76 \\ \underline{4} \quad 1088,16 \\ 2720805) \quad 13,604025 \\ \underline{5} \quad 13,604025 \\ (0) \end{array}$$

*Ex. 3.* What is the square root of 0,06076225 decimal parts?

Operation. 0,06076225 (0,2465, the root re-  
0,04 = 2 × 2 (quired.

$$\begin{array}{r} ,44) \quad 207 \\ \underline{4} \quad 176 \\ ,486) \quad 3162 \\ \underline{6} \quad 2916 \\ ,4925) \quad 24625 \\ \underline{5} \quad 24625 \\ (0) \end{array}$$

What is here done in whole numbers, mixed numbers, and decimals, may also be done by vulgar fractions, if you first change the given fraction into decimals.

*Ex. 4.* Let it be required to extract the square root of  $\frac{16}{25}$ ? First,  $\frac{16}{25} = 0,64$ .

Then 0,64 (8, the root required.

$$\begin{array}{r} ,64 \\ (0) \end{array}$$

In these four examples, the resolvend hath been a perfect square; and therefore the root hath been extracted without leaving any remainder: but it very often happens that the resolvend is not a true figurative number according to the proposed power: that is, it is not a perfect square, cube, biquadrate, &c. and then something will remain, after the extraction hath been made throughout all the points. Such numbers are called furd numbers, and their roots can never be truly found, but will become a continued series ad infinitum; if to the remainder there be still annexed cyphers ac-

cording as the proposed power requires, viz. by two's in the square, three's in the cube; four's in the biquadrate, &c. and the operations continued on as before.

*Ex. 5.* Suppose it were required to extract the square root of 6968.

Operation. 6968 (83,4745, &c.  
64

$$\begin{array}{r} 163) \quad 568 \\ \underline{3} \quad 489 \\ 1664) \quad 79,00 \\ \underline{4} \quad 66 \quad 56 \\ 16687) \quad 12 \quad 4400 \\ \underline{7} \quad 11 \quad 6809 \\ 166944) \quad 759100 \\ \underline{4} \quad 667776 \\ 1669485) \quad 9132400 \\ \underline{5} \quad 8347425 \\ 1669490 \quad 784975, \text{ \&c.} \end{array}$$

Thus the root of a furd number may be continued on to what exactness you please, but cannot be truly found.

EXTRACTION of the Cube Root, may be performed by the following method, which admits of two cases.

Having pointed the given resolvend into periods of three places, as before directed, seek a cube number that comes the nearest to the first period of the resolvend, whether it be greater or less than that period.

Case 1. If the cube number so taken be less than the first period of the resolvend, call its root less than just, and subtract that cube from the first period of the resolvend.

Case 2. But if the cube be greater than the first period of the resolvend, call its root more than just, and subtract the resolvend from that cube, annexing cyphers to it.

To the first root, whether it be less, or more than just, annex so many cyphers as there are remaining points over the whole numbers of the resolvend; and multiply it with 3, then make the product a divisor, by which you must divide the difference between the resolvend and the aforesaid cube, then will that quotient be a resolvend depressed to a square; and therefore it must be pointed as such, viz. into periods of two figures each. That being done, make the first root (without these cyphers that were annexed to it) a divisor, inquiring how often it may be found in the first period of the new resolvend (as before in extracting the square root) with this consideration, that if the root (now a divisor) be less than just, you must annex the quotient figure to it, and then multiply the root so increased, in the said quotient figure; setting down the units place of their product under the pointed figure of that period, and subtracting it as in division: and so on from one period to another, as before.

But if the said root, now a divisor, be more than just, then you must subtract the quotient figure from cyphers annexed, or supposed to be annexed to the divisor; multiplying the root so decreased into the quotient figure; setting down their product as before, &c. An example or two will render the work plain and easy.

Example 1.

What is the cube root of 146363183, the given resolvend, to be pointed thus 146363183 (5 the first root, less than just.

$$\begin{array}{r} 125 = \text{the nearest cube to } 146 \\ 500 \times 3 = 1500 \quad 21363183 \quad (14242,12 \text{ New resolvend.} \\ 1\text{st. Div. } 5) \quad 14242,12 \quad (527 \text{ the root required.} \\ \quad \times \quad 2 \quad 104 \\ 2\text{d. Div. } 52) \quad 3842 \\ \quad \times \quad 7 \quad 3689 \\ \text{Root } 527 \quad (153) \text{ the remainder to be rejected.} \end{array}$$

Here



EXT.

Here the root 527 is the true root at the first operation, as may be easily tried by involving it.

That is,  $527 \times 527 \times 527 = 146363183$ , the given resolvend. But, if it had not been the true root, then every thing that hath been here done must have been repeated; only, instead of the first single root (viz. 5.) you must have taken the increased root, viz. 527, and this is called a second operation; which would increase the last root to nine places of figures, viz. every operation triples the number of places in the last root.

N. B. It often happens that four, and sometimes five places of figures, may be taken into the root, especially when the second place proves to be a cypher. That is, when the first cube comes very near to the first period of the resolvend.

Example 2.

What is the cube root of  $67507824239$  (4000 root less  
First nearest cube = 64 (than just.

$$\begin{array}{r}
 \text{Root } 4000 \times 3 = 12000 \quad 3507824239 \quad (292318,68 \\
 \quad \quad \quad 4) \\
 \times \quad 0 \quad 292318,68 \quad (4071,8 \\
 \hline
 1. \text{ Divisor,} \quad 40) \quad 2923 \\
 \times \quad 7 \quad 2849 \\
 \hline
 2. \text{ Divisor,} \quad 407) \quad 7418 \\
 \times \quad 1 \quad 4071 \\
 \hline
 3. \text{ Divisor,} \quad 4071) \quad 3347,68 \\
 \times \quad ,8 \quad 3257,44, \&c.. \\
 \hline
 \text{Root} = 4071,8
 \end{array}$$

In this example, 5 figures are taken into the root, because the second place proved to be a cypher. And in these five the excess is not an unit in the last place; for if there were made a second operation, the root would be 4071,78, &c. as may be easily tried.

EXTRACTION *of the Square Roots of simple Algebraick Quantities.*

The square root of  $aa$  is  $+$  or  $-a$ ; the square root of  $9aa$  is  $+$  or  $-3a$ , and that of  $4aabb$  is  $+$  or  $-2ab$ : This is plain; for the square root of any quantity, suppose of  $4aabb$  is that which, being multiplied into itself, will produce  $4aabb$ . Now  $-2ab$  multiplied into itself will produce  $4aabb$ , as well as  $+2ab$ ; and, therefore, one quantity is as much its square root as the other.

When the square root of a quantity cannot be extracted; it is usual to signify it by this mark  $\sqrt{\phantom{x}}$ : Thus  $\sqrt{2aa}$  signifies the square root of  $2aa$ ; thus  $\sqrt{aa-4b}$  is the square root of the whole quantity  $aa-4b$ ; thus  $\frac{\sqrt{aa-4b}}{2a}$  signifies a fraction, whose numerator is the square root of the whole quantity  $aa-4b$ , and whose denominator is  $2a$ ; thus,  $\sqrt{\frac{4ab-a^3}{12a}}$  signifies the square root of the whole fraction  $\frac{4ab-a^3}{12a}$ ; that is, the square root of both the numerator and denominator.

When the square root of a quantity cannot be extracted, the quantity may sometimes, however, be resolved into two factors, whereof the one is a square, and the other not: And whenever this is possible, the root of the square may be extracted, and the radical sign may be prefixed to the other factor: Thus,  $12aa = 4aa \times 3$ ; therefore,  $\sqrt{12aa} = 2a \times \sqrt{3}$ .

EXTRACTION of the Square Roots of compound Algebraick Quantities.

The extraction of the square root of compound algebraick quantities is so very like that of whole numbers in common arithmetick, especially in the case of serieses, where it is chiefly required, that a bare inspection of the work might be sufficient: However, take the following directions with an example.

E X T

Let it be required to extract the square root of  $x^6 + 4x^5 + 10x^4 + 20x^3 + 25x^2 + 24x + 16$  : Here pointing every other place from the place of units, that is, from 16, is demanded the square root of the member belonging to the first point to the left hand, that is, of  $x^6$ , and the answer is  $x^3$ , which put down in the quotient ; then square  $x^3$ , and subtract the product  $x^6$  from  $x^6$ , and there remains nothing : Then bring down the two next members belonging to the next point, to wit,  $4x^5 + 10x^4$  for a resolvend, and divide it by  $2x^3$  ; the double of the root in the quotient ; that is, divide  $4x^5$  by  $2x^3$ , and the quotient is  $2x^2$ , which put down in the quotient, as likewise after the divisor  $2x^3$  ; then multiply the quantity  $2x^3 + 2x^2$ , by its last member  $2x^2$ , and the product  $4x^5 + 4x^4$  subtract from the resolvend  $4x^5 + 10x^4$ , and there remains  $6x^4$  ; to this remainder bring down the next two places  $20x^3 + 25x^2$  ; and so have a new resolvend, which divide by the double of the root already found, and do, as before, till the whole be divided, as you may see in the work :

$$\begin{array}{r}
 x^6 + 4x^5 + 10x^4 + 20x^3 + 25x^2 + 24x + 16 \\
 x^6 \qquad \qquad \qquad (x^3 + 2x^2 + 3x + 4) \\
 \hline
 2x^3 + 2x^2 \quad ) \quad * + 4x^5 + 10x^4 \\
 \quad + 2x^2 \quad \quad \quad 4x^5 + 4x^4 \\
 \hline
 2x^3 + 4x^2 + 3x \quad ) \quad * + 6x^4 + 20x^3 + 25x^2 \\
 \quad + 3x \quad \quad \quad 6x^4 + 12x^3 + 9x^2 \\
 \hline
 2x^3 + 4x^2 + 6x + 4 \quad ) \quad * + 8x^3 + 16x^2 + 24x + 16 \\
 \quad + 4 \quad \quad \quad 8x^3 + 16x^2 + 24x + 16 \\
 \hline
 \qquad \qquad \qquad * \quad * \quad * \quad *
 \end{array}$$

Otherwise thus :

$$\begin{array}{r}
 x^6 + 4x^5 + 10x^4 + 20x^3 + 25x^2 + 24x + 16 \\
 \hline
 (x^3 + 2x^2 + 3x + 4) * \\
 \hline
 2x^3 + 2x^2 \quad ) * + 4x^5 + 4x^4 \\
 \hline
 2x^3 + 2x^2 + 3x \quad ) * + 6x^4 \\
 \hline
 2x^3 + 4x^2 + 6x + 4 \quad ) * + 8x^3 + 16x^2 \\
 \hline
 \phantom{2x^3 + 4x^2 + 6x + 4} + 4 \quad ) * + 8x^3 + 16x^2 + 24x + 16 \\
 \hline
 \phantom{2x^3 + 4x^2 + 6x + 4} \phantom{+ 4} * \phantom{+ 4} * \phantom{+ 4} * \phantom{+ 4} *
 \end{array}$$

Since the last member + 16 was a square, the extraction might have begun at that end, and the root would have come out the same as before, but inverted. — 16 is no square number, since there is no root, either affirmative or negative, which, when multiplied into itself, will produce — 16.

Let it be supposed to extract the square root, or, at least, to reduce the root to the simplest expression of  $12x^3 - 72x^2 + 108x$ : This quantity, because neither of the extremes are squares, must be reduced to a more convenient form thus; if  $12x^3$  be divided by  $12x$ , the quotient  $xx$  will be a square number; therefore divide the whole by  $12x$ , and the quotient is  $xx - 6x + 9$ : whence conclude, e converso, that if  $xx - 6x + 9$  be multiplied into  $12x$  the product will be the quantity proposed; therefore  $\sqrt{12x^3 - 72x^2 + 108x}$ , is equal to  $\sqrt{xx - 6x + 9}$  into  $\sqrt{12x}$ : But  $\sqrt{x^2 - 6x + 9}$ , being extracted as above, is  $x - 3$ , or  $3 - x$ ; and because  $12x = 4 \times 3x$ , we have  $\sqrt{12x} = 2 \times \sqrt{3x}$ ; therefore  $\sqrt{12x^3 - 72x^2 + 108x} = x - 3$ , or  $3 - x$  into  $2 \times \sqrt{3x} = 2x - 6$ , or  $6 - 2x$  into  $\sqrt{3x}$ .

If the square root of the factor  $xx-6x+9$  could not otherwise have been extracted, it might, however, have been obtained by an approximation, as shewn under the article *BINOMICAL Theorem*, which see.

EXTRACTION of the Cube Root of Algebraical Quantities.

The method of extracting the cube root of algebraical quantities differ so little from that already delivered: for extracting it numerically, that we presume it will be needless to give any examples; we shall therefore only add



add the following theorem, to shew the reason of these operations.

Suppose it were required to find the value of  $x^3 = G$ . Put  $r + y = G$ , supposing  $r$  less than the true root; involve  $r + y$  to the third power, and we shall have  $r^3 + 3rry + 3ryy + y^3 = x^3 = G$ ; and  $3rry + 3ryy + y^3 = G - r^3$ ; and  $ry + y^2 + \frac{y^3}{3r} = D$ . Let  $\frac{y^3}{3r}$  be rejected as of small value; then it will be  $ry + y^2 = D$ , which gives this theorem  $\frac{D}{r + y} = y$ . By this theorem, the examples given in extracting the cube root numerically are performed.

EXTRAVASATION, in medicine, is applied to the blood, or any sort of fluid, when got out of the vessels in which it ought to be contained.

EXTREME and mean Proportion, in geometry, is when a line is so divided, that the rectangle of the whole line, by the lesser segment, is equal to the square of the greater segment, which is done by propof. xi. book 2. of Euclid's Elements.

EXTREMES, in logick, are those terms in the conclusion of any syllogism, that have a relation to some other term as a mean.

EXULCERATION, in surgery, properly signifies the same as ulcer, but is generally used to signify those erosions which begin to form an ulcer.

EXUVIAE, the cast off parts, or coverings of animals, as the skins of serpents, caterpillars, and other insects.

EXUVIAE is also used to signify the remains of animals petrified, and more properly called marine fossils.

EYE, *Oculus*, in anatomy, the organ of sight; or the part of the body whereby visible objects are represented to the mind.

With regard to the eyes we are to observe first, their situation, which is in the upper part of the face, in order that we may be able to see at a greater distance than otherwise we could. Secondly, their figure, which, excepting for the internal parts, is globular; and thirdly, their colour, which in the human species is variable; some being black, others greyish, and others bluish. The parts which do not enter into the composition of the eye, but are destined for the assistance of seeing, are the eyebrows, the eyelids, and the muscles of the eyes.

The eye-lids are the integuments of the eyes: there are two of them to each, an upper and an under-lid; and, at their joining, there are formed two corners, called canthi, an interior and larger, and an exterior and smaller; they are capable of closing and opening at pleasure, by means of muscles. They are composed of the epidermis, the cutis, which is very thin, and an arched cartilage, called the tarsus of the eye-lid; and are lined on the inner surface with a fine and delicate soft membrane, very sensible, and continuous with the periorbteum, and the albuginea of the eye.

The eye-lashes are certain rigid hairs, situated on the arch or tarsus of the eye-lids, and bent in a very singular manner; they are destined for keeping external bodies out of the eye, and for moderating the influx of light.

The glandulae sebaceae are situated the internal surface of the eye-lids: they serve for the secretion of an oleaginous fluid, which is of great use in preventing the attrition of the eye-lids, from their continual motion.

After this we observe the caruncula lachrymalis. See the article CARUNCULA.

The glandula lachrymalis is situated in the orbit, above the smaller angle, with its excretory ducts under the upper eye-lid.

The puncta lachrymalia are two.

The use of the eye-lids is to cover and defend the eyes; to wipe off foulness from the cornea; to moderate the influx of light, at pleasure; and, by their frequent motion, to occasion a secretion of a necessary fluid from the glands.

The muscles of the eyes, serving to their motions, are in the human frame six in number: four straight, viz. the attollens, deprimens, adductor, and abductor; and two oblique, the superior and inferior.

Between, and among these, there is a considerable quantity of fat serving for various important purposes.

The proper parts of the eye which form its globe or blub, are its coats or tunicks, the humours and the vessels.

The coats of the eye are several; 1. The albuginea, adnata, or conjunctiva. 2. The cornea. 3. The sclerotic, in which what is called the aqueducts of Nuck are to be observed. 4. The choroides. 5. The uvea; wherein we are to observe, 1. Its anterior coloured surface, called the iris, which is entirely vascular, and from which arises the variety of colours in the human eyes. 2. The pupil or foramen, which is round in the human eye, is nearly in the middle of the iris, and is capable of dilatation and contraction. 3. Its posterior surface, which is black, and in which, when this blackness is cleared away, there appears the sphincter of the pupil, formed of circular fibres for contraction; the ciliary fibres, or processes for the dilatation of the pupil; the ciliary ligament for the motion of the vitreous and crystalline humours; the arterial and venal circles, from which the vessels are in a wonderful manner distributed over the uvea; the choroides; the ligamentum ciliare; and the vitreous and crystalline humours; the ductus nigri, so called from their black colour, placed between the processes and the ligamentum ciliare; the space between the uvea and the cornea, called the anterior camera of the eye; and that between the uvea and the crystalline, called its posterior camera, which is either much smaller or entirely wanting. Many authors have attributed glands to the uvea, but they are very difficult to be distinguished, if there be any.

Finally, we are to mention the retina, which is a very delicate, tender, and, as it were, mucous coat of the eye; or, more properly, it is only an expansion of the optick nerve at the bottom of the eye: it is a primary part of the eye, and the great organ of vision, for the sake of which all the rest were formed.

The humours of the eye are generally established to be three; their office is to serve for the expansion of the coats, and for the refraction of the rays of light, they are distinguished by the name of aqueous, vitreous, and crystalline.

After these three humours of the eye, we observe the tunica arachnoides: this is an extremely thin and fine vascular membrane, which surrounds the crystalline and the vitreous humour, and by the assistance of which the crystalline lens is lodged in the fovea of the vitreous humour. On the cutting or breaking of this membrane, the crystalline falls out.

The blood-vessels are next to be considered: these are distributed in an amazing manner through the internal parts of the eye. Arteries from the internal and external carotids go to the eye in many different parts. There are also numbers of extremely minute ones, which convey only a fine and subtle lymph thither, by which means the tunicks and humours of the eye are nourished; the veins partly carry the blood back to the sinuses of the dura mater, and partly to the jugulars.

Besides these vessels, Valsalva assures us, that he discovered a number of true and proper lymphaticks in the eye of an ox.

The nerves of the eye are very numerous: besides the optick nerve, which, by its expansion forms the retina, and enters the eye from the side of the nose, there are the third and fourth pair of the brain, and a fifth and sixth branch distributed about the muscles, membranes, eye-lids, and lachrymal sacculus and gland.

Motions of the EYE are either external or internal. The external motion is that performed by its four straight and two oblique muscles, whereby the whole globe of the eye changes its situation or direction. The spherical figure of our eyes, and their loose connection to the edge of the orbit, by the tunica conjunctiva, which is soft, flexible and yielding, does excellently dispose them to be moved this, or the other way, according to the situation of the object we would view. By the membranes already described, the eye is connected to the edge of the orbit, but not in the least impede its necessary motions; and that great quantity of fat placed all round the globe, betwixt it and the orbit, lubricates and softens the eye, and renders its motions more easy: hence arise the three following remarkable



marable observations. 1. When nature has denied the head any motion, it is observable, that she has, with great care and industry, provided for this defect. To this purpose belongs the surprizing beautiful and curious mechanism observable in the immovable eyes of flies, wasps, &c. They nearly resemble two protuberant hemispheres, each consisting of a prodigious number of other little segments of a sphere, all which segments are perforated by a hole, which may be called their pupil, in which this is remarkable, that every foramen or pupil, is of a lenticular nature, so that we see objects through them topsy-turvey as through so many convex glasses: yea, they become a small telescope, when there is a due focal distance between them and the lens of the microscope by which they are viewed. Leuwenhoek's observations make it probable, that every lens of the cornea supplies the place of the crystalline humour, which seems to be wanting in those creatures, and that each has a distinct branch of the optick nerve answering to it, upon which the images are painted, so that as most animals are binocular, and spiders for the most part octonocular, so flies, &c. are multocular, having in effect as many eyes as there are perforations in the cornea, by which means, as other creatures but with two eyes are obliged, by the contraction of the muscles above enumerated, to turn their eyes to objects, these have some or other of their pupils always ready placed towards objects nearly all around them; whence they are so far from being denied any benefit of this noble and most necessary sense of sight, that they have probably more of it than other creatures, answering to their necessities and ways of living.

II. As in man, and most other creatures, the eyes are situated in the head, because, among other reasons, it is the most convenient place for their defence and security, being composed of hard bones, wherein are formed two large, strong sinuses, or sockets, commonly called orbits, for the convenient lodging of these tender organs, and securing them against external injuries; so in those creatures whose head, like their eyes and the rest of their body, is soft and without bones, nature hath provided for this necessary and tender organ, a wonderful kind of guard, by enduing the creature with a faculty of withdrawing his eyes into his head, and lodging them in the same safety within his body. We have a very beautiful example of this in snails, whose eyes are lodged in four horns, like atramentous spots, one at the end of each horn, which they can retract with pleasure, when in any danger. Here it may be also observed, that the hardness of the cornea in all animals that want eye-lids, as fishes, exactly resembles the horn of a lanthorn; and therefore is not hurt by such particles as their eyes are commonly exposed to. And in the mole, because this animal lives under ground, it was necessary its eyes should be well guarded and defended against the many dangers and inconveniencies to which its manner of living exposes it; this is the reason why its eyes are so small, and that they are situated so far in the head, and covered so strongly with hair; and besides, they can protrude and retract them at pleasure.

III. The third and last reflection we shall make upon the external motion of our eyes, is what regards a problem which has very much perplexed both physicians and philosophers, viz. What is the cause of the uniform motion of both eyes.

In some creatures, such as fishes, birds, and among quadrupeds, the hare, camelion, &c. the eyes are moved differently; the one towards one object, and the other towards another. But in man, sheep, oxen and dogs, the motions are so uniform, that they never fail to turn both towards the same place: hence in operations upon the eye, that require it to be kept immoveable, sometimes it is necessary to tie up the sound eye with a compress, by which means the other is easier kept fixed and immoveable.

The final cause of this uniform motion is, 1. That the sight may be thence rendered more strong and perfect: for since each eye apart impresses the mind with an idea of the same object, the impression must be more strong and lively, when both eyes concur; and that both may concur, it is necessary that they move uniform-

ly; for though the retina, or immediate object of vision, be expanded upon the whole bottom of the eye, as far as the ligamentum ciliare, yet nothing is clearly and distinctly seen, but what the eye is directed to. 2. A second advantage we reap from the uniform motion of the eyes, which is more considerable than the former, consists in our being thereby enabled to judge with more certainty of the distance of objects. See VISION.

There is as yet another advantage, full as considerable as any of the former, that is thought to arise from the uniform motion of our eyes, and that is, the single appearance of objects seen with both our eyes; which, though at first view it does not appear probable, is true: for if, in looking at an object, you impress one of your eyes aside with your finger, and alter its direction, every thing will be seen double.

By the internal motions of the eye, we understand those motions which only happen to some of its internal parts, such as the crystalline and iris; or to the whole eye, when it changes its spherical figure, and becomes oblong or flat. The internal motions of our eyes are either such as respect the change of conformation, that is necessary for seeing distinctly, at different distances, or such as only respect the dilatation and contraction of the pupil. That our eyes change their conformation, and accommodate themselves to the various distances of objects, will be evident to any person, who but reflects on the manner and most obvious phenomena of vision.

Authors are very much divided in their opinions with regard to the mechanism by which this change is introduced, as well as what parts it consists in: for some are of opinion, that the whole globe changes its form, by being lengthened into an oblong figure, when objects are near, and by becoming flat, when they are removed to a greater distance; and others are of a quite contrary opinion.

With regard to the change of the crystalline, and the mechanism by which it is produced, some maintain, that according as objects are at different distances, this humour becomes more or less convex, which does indeed very well account for distinct vision at all distances; for objects painted on a sheet of white paper, by means of a lens placed in the hole of a window-shutter, in a dark room, have their images always distinct, at whatever distance they be from the window, provided that the lens be of a convexity answerable to that distance. See LENS, &c.

Others again are of opinion that the crystalline never changes its figure, but that it is moved to and from the retina, according to the distance or proximity of the object in view, and this also does equally well account for the distinct appearance of objects at all distances, as is evident from the laws of opticks.

*Diseases of the EYE* are, an ophthalmia, or inflammation of the eyes; the gutta serena, or amaurosis; a suffusion, or cataract; an ectropium; a glaucoma; an amblyopia, or obscurity of sight, containing the myopia, the presbytopia, the nyctalopia, and the amaurosis; the strabismus, or squinting; an unguis, pannus, or pterygium of the membrane of the eye; the albugo, leucoma, or spot in the eye; a fugillation of the eye; an apiphora, or rheum in the eyes, and the fistula chrymalis. See each disease under its respective name.

*Atoms and Flies appearing before the EYES.* These images, or appearances, arise before the eyes from an obstruction of the optick nerve, from the fine fibres of the retina, or from the small veins contained therein, that is, they seem to be too much dilated, and are cured with difficulty; and especially if they are inveterate, because they are not seldom the forerunners of a gutta serena; in the beginning they may be cured with such things as open obstructions, especially those medicines mentioned in the cure of the gutta serena.

*Defluction on the EYE.* For a watery eye, if it arises from a weakness of the lachrymal gland, it will be proper to use strengtheners, externally, as spirit of wine, Hungary water, spring water, fennel, or valerian water, wherewith the parts adjoining are to be washed. Internally the abounding serum must be evacuated, or revulsed: if it be too sharp, it must be corrected by balsam-



micks, and medicines against catarrhs; such as essence of amber, and decoction of the woods. The revulsion must be made by blisters and issues.

*Wounds in the EYES.* If the eye is wounded, but not so as to let out the vitreous or crystalline humour, the following method will be of great service. The wound should be anointed, two or three times in a day, with a feather, or fine rag, well dipped in unguentum alabastrinum; and afterwards, a small compress laid over it, being well saturated with a collyrium, made of the whites of two eggs, two ounces and a half of rose water, half a drachm of oil of roses, and three grains of camphor, well mixed together. The bowels should also be kept loose for some days, with cooling and opening medicines: if the patient is of a plethorick habit, blood should be drawn from the neck or feet; all warm or sharp things should be thrown out of the patient's diet, and great care taken to keep him quiet. When the crystalline humour sticks in the orifice of the wound, it should be pulled out, that it may not bring on any deformity, or other mischief. When the vitreous and crystalline humours are fallen out of the eye, not only the sight but figure of the eye must be entirely destroyed, therefore, at first, it should be dressed with compresses dipped in warm wine, and afterwards with some vulnerary balsam.

*Contusions of the EYE.* When the eye is contused by any accident, it will be intirely deprived of sight, except the contusion is very small, and proper remedies are instantly applied. If the eye therefore has received a slight contusion, you may wash it frequently, for the first day, with cold spring water, covering it with linen rags, wet with the same. On the next day, rub it externally with camphorated spirit of wine, covering it with stupes wrung out of vinous decoctions of eye-bright, speedwell, hyssop, sage, camomile-flowers, and fennel-seeds. If you cannot get these herbs, apply bolsters dipped in warm wine, renewing them often. If the contusion is large, or the patient of a plethorick habit, you must open a vein.

*To extract Bodies fallen into the EYE.* See EXTRACTION.

*Artificial EYE,* a kind of camera obscura. See the article CAMERA OBSCURA.

EYE, in architecture, is used to signify any round window, made in a pediment, an attick, the reins of a vault, or the like.

*EYE of a Dome,* an aperture at the top of a dome, as that of the Pantheon at Rome, or of St. Paul's at London: it is usually covered with a lanthorn.

*EYE of the Volute,* in architecture, is the centre of a small circle in the middle of the volute, where the

helix or spiral, of which it is composed begins. In the circumference of this small circle, the thirteen centres for describing the circumvolutions of the volute are found.

EYE, in agriculture and gardening, implies a little bud or shoot, inserted into a tree, by way of inoculation.

*EYE of a Tree,* a small pointed knot to which the leaves stick, and from which the shoots or branches proceed.

EYE-BRIGHT, *Euphrasia*, in botany, a genus of plants, the corolla of which consists of a single ringent petal; the tube is of the length of the cup; the upper-lip is concave and emarginated; the lower one is patent, and divided into three segments: the fruit is an ovato-oblong, compressed capsule, forming two cells: the seeds are numerous, very small, and of a roundish figure. This plant is an ophthalmick and cephalick, and good for a weak memory.

*EYE of the Anchor,* the hole through which the ring is inserted into the shank.

*EYE of the Strap of a Block,* among seamen, the part of the strap left for fastening to any part of the ship or rigging.

*Bulls EYE,* in astronomy, the same with aldebaran. See ALDEBARAN.

EYRE, or EIRE, in law, implies the court of itinerant justices.

EZEKIEL, a canonical book of the Old Testament, referring chiefly to the degenerate manners and corruptions of the Jews of those times.

It abounds with fine sentences and rich comparisons, and discovers a good deal of learning in profane matters.

Ezekiel was carried captive to Babylon with Jehoniah, and began his prophecies in the fifth year of the captivity. He was cotemporary with Jeremiah, who prophesied at the same time in Judea. He foretold many events, particularly the destruction of the temple; the fatal catastrophe of those who revolted from Babylon to Egypt, and the happy return of the Jews to their own land.

EZRA, a canonical book of the Old Testament, comprehending the history of the Jews from the time of Cyrus's edict for their return, to the twentieth year of Artaxerxes Longimanus. It specifies the number of Jews who returned, and Cyrus's proclamation for the rebuilding the temple, together with the laying its foundation, the obstructions it met with, and the finishing thereof in the reign of Darius.

The illustrious author of this book, was also the restorer and publisher of the canon of the Old Testament.



# F.

## F A B

**F** The fourth consonant, and sixth letter of the alphabet. The letter is borrowed from the digamma or double gamma of the Æolians, as is evident from the inscription on the pedestal of the colossus at Delos; and was undoubtedly formed from the old Hebrew Vau; and though this letter is not found in the modern Greek alphabet, yet it was in the ancient one, from whence the Latins received it, and transmitted it to us.

It is formed by a strong expression of the breath, and joining at the same time the upper-teeth and under-lip. It has but one sort of sound, which has a great affinity with *v* and *ph*, the latter being written for it by us in all Greek words, as *philosophy*, &c. though the Italians write *filosofia*.

The Romans for some time used an inverted F,  $\text{Ɔ}$ , instead of V consonant, which had no peculiar figure in their alphabet. Thus, in inscriptions we meet with *TERMINAƆIT*, *DIƆI*, &c. Lipsius and others say, that it was the emperor Claudius who introduced the use of the inverted digamma, or  $\text{Ɔ}$ ; but it did not long subsist after his death; for Quintilian observes, that it was not used in his time.

F or FA, in musick, is the fourth note in rising in this order of the gamut, *ut, re, mi, fa*. It likewise denotes one of the Greek keys in musick, destined for the bass.

F, in physical prescriptions, stands for *fiat*, or let it be done. Thus F. S. A. signifies *fiat secundum artem*.

F was also a numeral letter, signifying 40, according to the verse,

*Sexta quaterdenos gerit quæ distat ab alpha.*

And when a dash was added at top, thus  $\overline{\text{F}}$ , it signified 40,000.

FABA, the bean, in botany. See the article BEAN.

FABLE, *Fabula*, a tale or feigned narration, designed either to instruct or divert, disguised under the allegory of an action, &c.

Fables were the first pieces of wit that made their appearance in the world, and have been still highly valued, not only in times of the greatest simplicity, but among the most polite ages of the world. Jotham's fable of the trees is the oldest that is extant, and as beautiful as any that have been made since. Nathan's fable of the poor man is next in antiquity, and had so good an effect as to convey instruction to the ear of a king. We find Æsop, in the most distant ages of Greece; and in the early days of the Roman commonwealth; we read of a mutiny appeased by the fable of the belly and the members. As fables had their rise in the very infancy of learning, they never flourished more than when learning was at its greatest height; witness Horace, Boileau, and Fontaine. See APOLOGUE.

Fable is also used for the plot of an epick or dramatick poem, and is, according to Aristotle, the principal part, and, as it were, the soul of a poem. See DRAMA and EPICK.

In this sense the fable is defined to be a discourse invented with art, to form the manners by instruction, disguised under the allegory of an action. Aristotle divides the fable into simple and compound: the simple have no change of fortune; and the compound having a turn from bad fortune to good, and from good to bad. The contrivance of each fable must have two parts, the intrigue and the discovery. The compound fable, according to Aristotle pleases most, as having most variety.

Lord Bacon observes that the use of allegorical poetry is to envelope things, whose dignity deserves a veil, as when the secrets and mysteries of religion, policy, and philosophy are wrapped up in fables and parables. Others are of opinion that fable is so essential to poetry,

## F A C

that there is no poetry without it; the fable being as much the form and distinction of a poem, as the figure is to a piece of marble to denominate it a statue. It is requisite towards the perfection of a fable, that it be admirable and probable: however admirable the fable is, it can have no effect if it is not probable; and probability alone is too faint and dull for poetry, as what is only admirable is too extravagant and dazzling. It is, therefore, of the utmost importance to be able to know how to mingle those in such just temperament as may please the fancy without shocking the reason.

FABRICK, the structure or construction of any thing; particularly a house, hall, church, &c.

The word is Latin, *Fabrica*, and derived from *Faber*, a workman.

FABULOUS, something consisting of, or connected with, a fable. See the article FABLE.

FABULOUS *Age*, among ancient historians. See AGE.

FACADE, in architecture. See FACE.

FACE, in anatomy, that part of the head which is not covered with the usual long hair. See HEAD.

FACE, in architecture, the front of a building, or the side which contains the chief entrance. It is also sometimes used for the side which it presents to the street, garden, court, &c. and sometimes for any side opposite to the eye.

FACE of a Stone, in masonry, that superficies of it which lies in the front of the work.

FACE, in fortification, an appellation given to several parts of a fortress, as the face of a bastion, &c. See BASTION.

The face of a place is the front comprehended between the flanked angles of two neighbouring bastions, being composed of a curtain, two flanks, and two faces; and is likewise called the tenaille of a place. In a siege, the attacks are carried on against both bastions, when the whole tenaille is attacked.

Prolonged FACE, that part of the line of defence-razant, which is between the angle of the shoulder and the curtain, or the line of defence-razant, diminished by the length of the face.

FACE of a Gun, the superficies of the metal at the extremities of the muzzle of the piece.

FACE, in the military art, a word of command, intimating to turn about; thus, face to the right, is to turn upon the left heel a quarter round to the right; and, face to the left, is to turn upon the right heel a quarter round to the left.

FACE of Plants, among botanists, signifies their general appearance, which, being nearly the same in plants of the same genus, serves to distinguish them at first sight.

FACET, or FACETTE, among jewellers, the name of the little faces or planes to be found in brilliant and rose diamonds.

FACTION, a cabal or party formed in a state, city, or company.

FACTION, in antiquity, a name given to the different companies of combatants in the circus.

FACTITIOUS, is any thing made by art, and is usually taken in opposition to natural. Thus sope is a factitious body or concrete, but fullers-earth is a natural one.

FACTOR, in commerce, is an agent or correspondent residing beyond the seas, or in some remote part, commissioned by merchants to buy or sell goods on their account, or assist them in carrying on their trade. A factor receives from the merchants, his constituents, in lieu of wages, a commission of factorage, according to the usage of the place where he resides, or the business he transacts, this being various in different countries,



countries, and on the purchases and sales of different commodities. He ought to keep strictly to the tenor of his orders, as a deviation from them, even in the most minute particular, exposes him to make ample satisfaction for any loss that may accrue from his non-observance of them: and it is very reasonable it should be so, as the distance of this situation renders him unable to judge of his principal's views and intention.

**FACTOR**, in multiplication, a name given to the multiplier and multiplicand, because they constitute the product.

**FACTORAGE**, called also commission, is the allowance given to factors by the merchant who employs them. The gain of factorage is certain, however the voyage or sale prove to the merchant: but the commissions vary; at Jamaica; Barbadoes, Virginia, and most of the western parts of the world the commission runs at 8 per cent. generally through Italy,  $2\frac{1}{2}$ ; in France, Spain, and Portugal, &c, 2; and in Holland, and other places near home,  $1\frac{1}{2}$  per cent.

**FACTORY** is a place where a considerable number of factors reside, to negotiate for their masters or employers. See the article **FACTOR**.

The most considerable factories belonging to the British are those established in the E. Indies, Portugal, Turkey, &c.

**FACTUM**, in arithmetick, the product of two quantities multiplied by each other.

**FACULÆ**, in astronomy, certain bright and shining parts, which the modern astronomers have, by means of telescopes, observed upon or about the surface of the sun: they are but very seldom seen.

**FACULTY**, in law, a privilege granted to a person, by favour and indulgence, of doing what, by law, he ought not to do.

**FACULTY**, in the schools, a term applied to the different members of an university, divided according to the arts and sciences taught there.

**FACULTY of Advocates**, a term applied to the college or society of advocates in Scotland, who plead in all actions before the court of session.

**FACULTY**, is also used to imply the powers of the human mind, viz. understanding, will, memory, and imagination.

**FÆCES**, in chymistry, the gross matter, or sediment, that settles at the bottom after distillation, fermentation, and the like.

The fæces of wine are more generally known by the name lees. See **LEES**.

**FÆCES**, in medicine, the excrements voided by stool. See the article **EXCREMENT**.

**FÆCULA**, in pharmacy, a form of medicine, consisting of the fæces of vegetable juices, principally those of roots; the manner of making which may be gathered from the following example, as ordered in the college dispensatory. To make a fæcula of bryony, take the roots of that plant, any quantity; let them be scraped small with a knife, and squeeze out their juice with a press; after standing a few hours, in vessels that are without any motion, there will be a white sediment like starch, and it must be dried in glazed pans, after the watery part is poured off by inclination.

After the same manner is prepared the fæcula of arum, wild radish, orrice, and the like.

**FÆCULENT**, in general, is applied to things abounding with fæces, or dregs: thus the blood and other humours of the human body, are said to be fæculent, when without that purity which is necessary to health.

**FÆNUGREEK**, **FENUGREEK**, or **FOENUGEREK**. See the article **FENUGREEK**.

**FÆTOR**, or **FOETOR**. See the article **FOETOR**.

**FAGARA**, in the materia medica, a fruit brought from the E. Indies, much resembling the cubeb. This fruit is a berry, the exterior bark whereof is black and dusky, of an acrid aromack taste: this berry, when ripe, being cut open, exhibits a dark, shining, solid seed, without either taste or smell. It is recommended against frigidities in the liver; it assists concoction, is an astringent and stomachick.

**FAG-END**, in the sea-language, the end of any

rope which is untwisted and loosened by frequent use: to prevent this, the ends of ropes are generally well fastened by binding a piece of small cord or packthread around them, which is called whipping them.

**FAGONA**, in anatomy, a conglomerate gland, the same with thymus. See **THYMUS**.

**FAGONIA**, in botany, a genus of plants whose flower consists of a small pentaphylous calyx, with five heart-shaped patent petals, and ten erect subulated filaments topped with roundish antheræ. The fruit is a roundish acuminate capsule, composed of ten valves, which form five lobes and as many compressed cells, each containing a single roundish seed.

**FAGOPYRUM**, buck-wheat, in botany. See the article **BUCK-WHEAT**.

**FAGOTTINO**, in musick, is a single curtail, a musical instrument something like a bassoon. See **BASSOON**.

**FAGOTTO**, in musick, the double curtail, or in reality, a double bassoon, as big again as the former.

**FAGUS**, the beech, in botany. See **BEECH**.

**FAINT-ACTION**, in law, a feigned action, or such as, although the words of the writ are true, yet, for certain causes the plaintiff has no title to recover thereby.

**FAINT-PLEADER**, in law, a covinous, false, or collusory manner of pleading, to the deceit of a third person.

**FAINTING**. See the article **LIPOTHYMIA**.

**FAIR**, a greater kind of market, granted to a town, by privilege, for the more speedy and commodious providing of such things as the place stands in need of. See **MARKET**.

**FAIRY**, in ancient traditions and romances, signifies a sort of deity, or imaginary genius, conversant on earth, and distinguished by a variety of fantastical actions, either good or bad.

**FAIRY-CIRCLE**, or **RING**, a phenomenon pretty frequent in the fields, &c. supposed, by the vulgar, to be traced by the fairies in their dances: there are two kinds of it, one of about seven yards in diameter, containing a round bare path, a foot broad, with green grass in the middle of it. The other is of different highness, encompassed with a circumference of grass, greener and fresher than that in the middle. Mess. Jessop and Walker, in the Philosophical Transact. ascribe them to lightening, which is confirmed by their being most frequently produced after storms of that kind, as well as by the colour and brittleness of the grass-roots, when first observed.

Lightening, like all other fires, moves round, and burns more in the extremity than in the middle: the second circle arises from the first, the grass burnt up growing very plentifully afterwards. Others maintain that these circles are made by ants, which are frequently found in great numbers in these rings.

**FAITH**, in divinity and philosophy, the firm belief of certain truths upon the testimony of the person who reveals them.

The grounds of a rational faith are, 1. That the things revealed be not contrary to, though they may be above natural reason. 2. That the revealer be well acquainted with the things he reveals. 3. That he be above all suspicion of deceiving us.

Where these criterions are found, no reasonable person will deny his assent: thus, we may as well doubt of our own existence, as of the truth of a revelation coming from God, who can neither be deceived himself, nor deceive others by proposing things to be believed that are contradictory to the faculties he has given us. Whatever propositions, therefore, are beyond reason, but not contrary to it, are, when revealed, the proper matter of faith.

**FAKIR**, in pagan theology, a kind of Indian monks, who even outdo the mortifications and severities of the ancient Christian anchorets. Some of them mangle their bodies with scourges and knives; others never lie down; and others remain all their lives in one posture. There are also another kind of fakirs, who do not practise such severities; these flock together in companies, and



and go from village to village, prophesying and telling fortunes. It is said that even persons of fortune, in India, become fakirs, and that there are more than two millions of them.

**FALCATED**, in astronomy, the enlightened part in the moon, or any planet, that appears in the form of a sickle; which happens while the moon is moving from the conjunction to the opposition; but from the full to the new moon the enlightened part appears gibbous, and the dark falcated.

**FALCON**, or **FAUCON**, in gunnery, a piece of cannon, whose diameter at the bore is five inches and a quarter, weight 750 pounds, length 7 feet, load 2 pounds and a half, shot 2 inches and a half diameter, and 2 pounds and a quarter weight.

**FALCONET**, or **FAUCONET**, is a sort of ordnance, whose diameter at the bore is four inches and a half, weight four hundred pounds, length 6 feet, load one pound and a quarter, shot something more than 2 inches in diameter, and one pound and a quarter weight.

**FALCONRY**, the art of taming, managing, and tutoring hawks and falcons to catch their prey.

**FALL**, the descent of heavy bodies towards the centre of the earth. See *ACCELERATED Motion*.

**FALL**, among seamen, signifies that part of the rope of a tackle that is hauled upon. Also when a ship is under fail, and keeps not so near the wind as she should do, they say she falls off; or when a ship is not flush, but hath risings of some parts of her decks more than others, it is called falls.

**FALLACY**, a deception, fraud, or false appearance.

**FALLACY**, in logick, implies a sophism, or a false argument, used merely to deceive.

**FALLING SICKNESS**. See *EPILEPSY*.

**FALLOPIAN Tubes**, in anatomy, two canals of a tortuous figure, but approaching to a conick form; joined to the bottom of the uterus, one on each side.

**FALLOW**, a pale red colour, like that of brick half burnt: such is that of a fallow deer.

**FALLOW-FIELD**, or **FALLOW-GROUND**, land laid up, or that has lain untilled for a considerable time.

**FALLOWING of Land**, a particular method of improving land.

The great benefit of fallowing appears by the common practice of landlords, who every where take care to oblige their tenants to a strict observance of it once in three years; few lands being able to bear two crops without it.

It appears that none will find a year's fallowing a loss to them, let their land be what it will; but, more particularly, the advantage of fallowing consists in, first, its laying the land in ridges, and its exposing it to the frost, wind, sun, and dews, all which sweeten and mellow the land very much; the often stirring of it, and breaking the clots, dispose it for the bearing of good crops. Secondly, it kills the weeds, by turning up the roots to the sun and air; and kills not only the weeds that grew with the last corn, but wild oats, darnel, and other weeds that sow themselves, and that as soon as they begin to peep out of the ground; so that they have no time to suck out any of the heart of the land.

The way of ordering fallow-lands is, after the crop is off, to let the land lie all winter, and what grass and weeds grow on it, to eat off with sheep in April, or beginning of May. As soon as they have done sowing of corn, they begin to plow up their fallows. This first fallowing in many places, ought to be very shallow, well turned, and clapped close together, because the thinner the turf is, the easier will it dry through, and kill the weeds, especially if the weather be dry: but, in some places, where there is a very cold clay, that will not bear corn well without being exposed to the heat of the sun to warm it, they plow their first plowing the depth they design to go. About June is the time of the second plowing, which they call *try-fallowing*; at which plowing, you must go your full depth. About the latter end of July, or beginning of August, is the time of *try-fallowing*, or last plowing, before they sow their rye or wheat: but some plow up their land oftener.

If the land rise full of clots, and if it is a binding land, you must make it fine by harrowing of it, when rain

comes; but then you must not let it lie long before you strike, fife, or plow it up into small ridges, especially if it is wet land; and as near as you can, leave no weeds, turfs, or grass unkilld, or unbroke with your harrows. But if your land will dissolve well with the frost, it is best to let it lie a little rougher, especially if you design to sow it with barley; for the rougher it lies for a winter-fallowing, the better. If the winter does not dissolve the clots, which it will not do in binding lands, you must wait for rain for the fallowing it. Where the land is but indifferent, and manure is not to be got, fallowing every other year is found a great improvement. In some places they take a crop of wheat, and a crop of pease, and so fallow their land again.

**FALSE**, in general, something contrary to truth, or not what it ought to be: thus we say, a false witness, false action, false weights, false claim, &c. See the articles *WITNESS*, *ACTION*, &c.

**FALSE Arms**, in heraldry, are such in which the fundamental rules of the art are not observed; as if colour be put upon colour, or metal upon metal, &c.

**FALSE Attack**, in military affairs, is a feint attack, in order to draw all the forces of the enemy one way, whilst they actually attack them in another place.

**FALSE Braye**, in fortification. See *FAUSSE Braye*.

**FALSE Claim**, in the forest laws, is where a man claims more than his due, and is amerced or punished for the same.

**FALSE Flower**, in botany, is a flower which does not seem to produce any fruit, as those of the hawthorn, mulberry tree, &c. Or it is a flower that does not arise from any embryo, or that does not knit, as those of melons, cucumbers, &c.

**FALSE Imprisonment**, in law, a trespass against a man, by imprisoning him without a lawful cause.

**FALSE Keel**, in a ship, is a kind of supplemental or temporary keel, to save the other, should the ship happen to strike, or touch the ground.

**FALSE Muster**, in military affairs, is where names are inserted in a muster-roll, when no such persons are really in a regiment, &c.

**FALX**, in anatomy, a process of the dura mater, placed between the two hemispheres of the brain, and resembling a reaper's sickle.

**FAMILY**, in natural history, a term used by authors to express any order of animals, or other natural productions of the same class.

**FAMILY of Curves**, a congeries of different orders, which are all defined by the same indeterminate equation, but differently according to their different orders.

**FAN**, an instrument used in winnowing corn.

**FANATICKS**, wild, extravagant, visionary, enthusiastick persons, who pretend to be inspired.

**FAQUERS**. See *FAKIR*.

**FARCE**, originally implied those little pieces of drollery, exhibited by mountebanks and their buffoons in the open streets, to collect the people together: but it is now removed to the theatre, and called by the general name of entertainment.

**FARCIN**, **FARCY**, or **FASHIONS**, in farriery, a creeping ulcer, and the most loathsome, stinking and filthy disease, that a horse can be affected with.

It proceeds from corrupt blood engendered in the body by over heats and colds, and begins first with hard knots and pustules, which at length over-run the horse's whole body. Its origin is commonly in a vein, or near some master vein, which feeds and nourishes the disease.

Sometimes it is occasioned by spur-galling, with rusty spurs, snaffle-bit, or the bite of another horse infected with the same disease.

For the cure, first bleed the horse well; then take oil of bay and euphorbium mixed together, and anoint the knots with it; or bathe the place with the stale of an ox or cow, and the herb called lion's foot, all boiled together. Some apply tallow and horse-dung, burn the knots with a hot iron, or wash the sore with salt, vinegar, alum, verdigrease, green copperas, and gun-powder, boiled in chamber-lee. Others again anoint the sores with a salve made of a penny-worth of tar, two penny-worth of white mercury, and two handfuls of pigeon's dung.



*Water* **FARCIN**, a swelling under a horse's belly and chaps, which, being pierced with a hot iron, yields abundance of yellow, grey, and oily water. It proceeds from a horse's feeding in low watery grounds, or in pits and holes where the grass grows above water.

The common way of curing this malady, is by letting out the matter of the swelled parts with a long iron rod, heated red hot; washing the parts with chamber-lee and salt, mixed with some powder of bole armenick, and made as hot as may be endured, for three or four times.

**FARDING-DEAL**, the fourth part of an acre of land. See the article **ACRE**.

**FARE**, most commonly signifies the money paid for a voyage or passage by water; but, in London, it is what persons pay for being conveyed from one part of the town to another in a coach, chair or boat.

**FARINA**, a Latin term, signifying meal, or the flour of corn.

**FARINA FOECUNDANS**, among botanists, the impregnating meal or dust on the apices or antheræ of flowers, which being received into the pistil, uterus, or seed-vessel of plants, fecundates the rudiments of the seeds in the ovary, which otherwise would decay and come to nothing. See the article *GENERATION of Plants*.

**FARM**, or **FERM**, signifies the chief messuage in a village, or any large messuage, whereto belongs land, meadow, pasture, wood, common, &c. and which has been used to let for term of life or years, under a certain yearly rent payable by the tenant for the same.

In different parts of the country, a farm is called by different appellations: in Lancashire it is termed ferm-hold; in Essex, a wike; and in the north a tack. According to some, a farm should make three rents, or its produce should amount to three times the rent, one for the landlord, another for the charges of cultivating it, and the third for the farmer and his family to live on.

**FARMER**, the person who occupies or is lessee of a farm, whether for life or years. See **FARM** and **LEASE**.

**Husbandman** is the proper addition of a farmer, husbandry being the mystery or art he professes.

**FARMER**, among miners, signifies the lord of the field, or the person who farms the lot and cope of the king.

**FARRIER**, one whose employment is to shoe horses, and cure them when diseased or lame.

**FARRIERY**, the art of trimming the feet, and curing diseased horses. See the article **HORSE**.

**FARTHING**, the least copper coin used in Britain, or the half of the half-penny. See **EXCHANGE**.

**FASCES**, in Roman antiquity, axes bound up together with rods or staves, and carried before the Roman magistrates as a badge of their authority and office.

**FASCETS**, in the art of making glass, are the irons thrust into the mouths of bottles, in order to convey them into the annealing tower.

**FASCIA**, in architecture, signifies any flat member having a considerable breadth and but a small projecture, as the band of an architrave, larmier, &c.

**FASCIAS**, in brick buildings, are certain juttings out of the bricks over the windows of each story, except the upper one. These are sometimes plain, like those of columns; but sometimes they are moulded, and the moulding is usually a scima reversa at the bottom, above which are two plain courses of bricks, then an astragal, and lastly a boultime. See **ASTRAGAL** and **BOULTINE**.

**FASCIA LATA**, in anatomy, called also *musculus membranofus*, is a muscle of the tibia or leg, arising fleshy from the anterior part of the anterior and superior spine of the illeum. Soon after its origin it becomes entirely membranaceous, and closely surrounds the muscles of the thigh; after which it is inserted in the upper part of the tibia, near the head of the fibula, and from thence sends out an aponeurosis almost over the whole tibia.

The fascia lata serves to draw back the thigh, and to elevate both this and the leg; it is therefore, as well as some other of the adjacent muscles, common to both the thigh and the leg.

**FASCIÆ**, in astronomy, certain parts on Jupiter's body resembling belts or swaths. They are more lucid than the rest of that planet, and are terminated by par-

allel lines, sometimes broader and sometimes narrower. Mr. Huygens observed a fascia in Mars much broader than those of Jupiter, and possessing the middle part of his disk, but very obscure.

**FASCIALIS**, in anatomy, a muscle of the leg called also *fartorius*. See the article **SARTORIUS**.

**FASICULUS**, in medicine, denotes a handful, or according to some, as much as can be taken up between the finger and the thumb.

**FASCINATION**, a kind of witchcraft or enchantment supposed to operate by the influence either of the eye or tongue.

**FASCINES**, or **FAGGOTS**, in fortification, are small branches of trees or bavons bound up in bundles, which are used in an army, in order to cover themselves, and burn the enemies lodgments; and which, when mixed with earth, serve to fill up ditches, mend roads, &c.

**FASHION**, a term used among artificers in gold and silver, for the trouble, time, and labour employed in a piece of work. It is by the fashion that workmen's wages are regulated.

**FASHION-PIECES**, in ship-building, the aftmost or hindmost of the timbers of a ship, which limit the breadth and form the shape of the stern. See **SHIP-BUILDING**.

**FAST**, or **FASTING**, in general, denotes the abstinence from food; but is more particularly used for such abstinence on a religious account.

**FAST-DAYS**, those appointed, by publick authority, to be observed in fasting and humiliation.

**FAST-GROUND**, or **FAST-COUNTRY**, among miners, denotes the same with shelf. See **SHELF**.

**FASTERMANS**, among our Saxon ancestors, were pledges or bondsmen, who were answerable for each other's good behaviour.

**FASTI**, in Roman antiquity, the calendar wherein were expressed the several days of the year, with their feasts, games, and other ceremonies.

**FASTI CONSULARES**, a tablet or chronicle, wherein the several years were denoted by the respective consuls, with the principal events that happened during their consulship. And hence the term *fasti* is still applied to the archives and publick registers of a nation.

**FASTIGIUM**, in architecture, the same with pediment. See **PEDIMENT**.

**FAT**, in anatomy, an oleaginous or butyraceous matter, secreted from the blood, and filling up the cavity of the adipose cells. Fat, properly and distinctly so called, is not secreted from glandules, but from the little arteries of the adipose membrane. Authors distinguish it into two kinds, which they express by the words *sebum* or *adeps*, and *pinguedo*.

According to this distinction, there is no such thing as *sebum* or hard fat in the human body, its fat being all of that sort expressed by *pinguedo*, or soft and oily. That this oleaginous matter has a circulatory motion, or an egress into the veins, is very evident from the sudden consumption of it in many diseases; and from its vast diminution by exercise or labour.

**FAT**, or **VAT**, also signifies any large wooden vessel, for holding different liquors; as wort, beer, &c.

**FATE**, *Fatum*, denotes an inevitable necessity depending upon a superior cause. Fate is a term much used among the ancient philosophers. It is formed *afando*, from speaking; and primarily implies the same with *effatum*, viz. a word or decree, pronounced by God; or a fixed sentence, whereby the Deity has prescribed the order of things, and allotted every person what shall befall him.

The Greeks call it *εναγκασμον*, a chain, or necessary series of things, indissolubly linked together; and the moderns, Providence.

It is sometimes used to denote the connexion of causes in nature, and also the Divine appointment, necessity, or eternal designation of things, whereby all agents are necessarily swayed, and directed to their ends. See **NECESSITY**.

Some authors divide *fate* into astrological and stoical. *Astrological FATE*, denotes a necessity of things and events, arising from the influence and positions of the heavenly



heavenly bodies, which give law, both to the elements and mixed bodies, and to the wills of men. In which sense the word is often used by Manilius: *Certum est & inevitabile fatum: materięque datum est cogi, sed cogere stellis.*

**Stoical FATE**, is defined by Cicero, an order or series of causes, wherein cause being linked to cause, each produces other; and thus all things flow from one prime cause. Chrysippus defines it a natural invariable succession of all things *ab æterno*, each involving other.

**FATHER**, a term of relation denoting a person who hath begot a child.

**FATHER**, in theology, is used in speaking of the first person of the Trinity. See the article **TRINITY**.

**FATHER** is also used in speaking of spiritual and moral things. Thus Abraham is called the father of the faithful.

**FATHER**, in church history, is applied to ancient authors who have preserved in their writings the tradition of the church.

**FATHER** is also the title of honour given to prelates and dignitaries of the church, to the superiors of convents, to congregations of ecclesiastics, and to persons venerable for their age and quality.

**FAVIFORM**, in general, something resembling a honey-comb. Surgeons give this appellation to certain ulcers, which emit a sanies through little holes, especially in the head. See **HONEY COMB**.

**FAUNALIA**, in Roman antiquity, three annual festivals in honour of the god Faunus, the first of which was observed on the ides of February; the second on the sixteenth of the calends of March; and the third on the nones of December.

**FAUNS**, **FAUNI**, or **SATYRS**, were a kind of rural deities, or rather demi-gods, among the Romans, and inhabited the woods; wherefore they were called *sylvani*; they were companions of Pan or Faunus. They were not known among the Greeks. The Latins represented them half man and half goat, with the horns, ears, feet, and tail of a goat, a flat nose, and with hair on their bodies.

**FAVORITO**, in musick, as *choro favorito*, a chorus, in which are employed the best voices and instruments, to sing the recitatives, play the ritornellas, &c. this is otherwise called the little chorus, or *choro recitante*. See **RECITATIVO**.

**FAUSSE-BRAYE**, in fortification, a small rampart without the true one, about three or four fathom wide, and bordered with a parapet and banquette.

**FAWN**, among sportsmen, a buck, or doe, of the first year; or the young one of the buck's breed in its first year.

**FEALTY**, in law, an oath taken on the admittance of any tenant, to be true to the lord of whom he holds his land: by this oath the tenant holds in the freest manner; on account that all who have fee, hold *per fidem et fiduciam*, that is, by fealty at the least.

**FEAST**, or **FESTIVAL**, is applied now to any solemnity or festivity; but, in the church, it signifies those days which are observed in honour of God, or of some saint.

**FEATHER**, **PLUMA**, the part which covers birds, and enables them to fly. See **BIRD**.

**FEATHER**, in horsemanship, a sort of natural frizzling of the hair, which in some parts rises above the rest, resembling the tip of an ear of corn. This happens most frequently between the eyes; and if lower, it is a sign of a weak sight.

A feather upon a horse's neck, is called a Roman feather; being a row of hair turned back, and forming a mark like a sword blade near the mane.

**Mid-FEATHER**, in the salt-works, the partition in the middle of the furnace, which it divides into chambers.

**FEATHER-EDGED**, among carpenters, an appellation given to planks or boards, which have one side thicker than the other.

**Prince's FEATHER**, a plant otherwise called amaranth. See **AMARANTHUS**.

**FEBRIFUGES**, in medicine, are such things as mitigate or remove a fever; they are otherwise called antifebrilia.

The word is Latin, *febrisfuga*, and derived from *febris* a fever, and *fugo* to remove, or drive away.

**FEBRIS**, **FEVER**, in medicine. See **FEVER**.

**FEBRUARY**, the second month in the year, reckoning from January. It was added to Romulus's calendar by Numa Pompilius.

**FECIALES**, or **FOECIALES**, a college of priests, instituted at Rome by Numa, consisting of twenty persons, selected out of the best families: Their business was to be arbitrators of all matters relating to war and peace, and to be the guardians of the publick faith.

**FECULA**, or **FÆCULA**. See **FÆCULA**.

**FECULENT**, or **FÆCULENT**. See **FÆCULENT**.

**FECUNDITY**, **FOECUNDITY**, the quality of any thing fertile or fruitful.

**FEE**, **FEUD**, **FEUDUM**, **FEODUM**, or **FIEF**, in law, signifies a right which, according to Sir Henry Spelman, a vassal hath in land, or some immoveable thing of his lord's, to take the profits thereof hereditarily, rendering to his lord such feudal duties and services as belong to military tenure, the mere propriety of the soil always remaining to the lord. Sometimes fee is used for the compass of a manor; as, also, for a personal right incorporeal, as to have the keeping of a prison in fee.

**FEE ABSOLUTE**, or **SIMPLE**, is that of which we are seized "to us and our heirs for ever."

**FEE CONDITIONAL**, or **FEE TAIL**, is that whereof we are seized to us and our heirs with limitation; that is, the heirs of our bodies, &c. And this fee-tail is either general or special: general, is where land is given to a man, and the heirs of his body: special, is that where a man and his wife are seized of lands, to them and the heirs of their bodies.

**FEE-FARM**, in law, signifies lands held of another in fee, that is, in perpetuity to himself and his heirs, for so much yearly rent as it is reasonably worth, more or less, so it be the fourth part of the value.

**FEE**, is also taken for a reward or wages given to a lawyer, or physician, for their advice in their respective professions.

**FEES**, also imply, settled perquisites or allowances, paid to publick officers, by persons who have business with them.

**FEELING**, *Touching*, one of the external senses, by which we attain the ideas of solid, hard, soft, rough, hot, cold, wet, dry, and other tangible qualities.

**FEINT**, in fencing, a shew at making a thrust at one part in order to deceive the enemy, that you may really strike him in another.

**FELAPTON**, in logick, one of the six moods of the third figure of syllogisms, wherein the first proposition is an universal negative, the second an universal affirmative, and the third a particular negative.

**FELIS**, in zoology, is used by Linnaeus as the name of a large genus of quadrupeds, of the order of the feræ; the characters of which are these: the fore-teeth are small, obtuse, and equal; the tongue is furnished with prickles, all pointing backwards; and the feet are formed for climbing, with claws which may be drawn in or exerted at the creature's pleasure.

To this genus belong the lion, tiger, leopard, cat, cat of the mountain, lynx, and ounce.

**FELLING of Timber**. See the article **TIMBER**.

**FELLOWS**, in fortification, are six pieces of wood, each whereof form a piece of an arch of 60 degrees, and joined, all together, by dulleges, make an intire circle; which with the addition of a nave, and twelve spokes, make the wheel of a gun carriage. Their thickness usually is the diameter of the ball of the gun they serve for, and their breadth something more.

**FELLOWSHIP**, or **COMPANY**, in arithmetick, is when two or more join their stocks, and trade together, dividing their gain, or loss, proportionably.

Fellowship is either with or without time. Questions without time, or in the single rule of fellowship, as it is frequently called, are wrought by the following proportion.

As the whole stock to the whole gain or loss, so is each man's particular stock to his particular share of gain or loss.

Example: I, A, B, and C make a joint stock: A puts in



in 460l. B 510l. and C 480l. they gain 340l. what part of it belongs to each?

In order to the solution of this question, find the total of their joint stock, viz.

A's stock 460l. + B's stock 510l. + C's stock 480l. = 1450l. the total stock. Then 1. To find A's share of the gain, state as follows: if 1450l. : 340l. :: 460l. which being worked by the rule of three, the answer will be 107l. 17s. 2½d. for A's share of the profit.

2. B's share of the gain, by stating thus, if 1450l. : 340l. :: 510l. and working by the rule of three, will be found to be 119l. 11s. 8½d.

3. C's share will appear 112l. 11s. 0½d. when worked as before, after having stated thus. If 1450l. : 340l. :: 480l.

Ex. II. Suppose three partners, A, B, and C make a joint stock in this manner: A puts in 24l. B 32l. and C 40l. in all 96l. with which they trade, and gain 12l. required each man's true share of that gain? The first operation for A's part of the gain will stand thus,

$$96l. : 12l. :: 24l. : 3l. = A's \text{ gain.}$$

$$96l. : 12l. :: 32l. : 4l. = B's \text{ gain.}$$

$$96l. : 12l. :: 40l. : 5l. = C's \text{ gain.}$$

Proof 3l. + 4l. + 5l. = 12l. the whole gain. That is, if the total of all their particular gains amounts to the whole gain, the work is true; if not, some mistake has been committed.

**FELLOWSHIP with Time**, usually called the *Double Rule of Fellowship*, because every man's money is to be considered with relation to the time of its continuance in the joint stock. It is worked thus, multiply each man's stock by the respective time he puts it in for, and add all the products; the total of which must be your first number through all the statings: the gain or loss the second, as before; and each man's particular stock, multiplied by its time, the third.

Note, all the particular times (if not so given) must be reduced into one denomination, i. e. all years, all months, all weeks, or all days, &c. See **REDUCTION**.

Ex. I. A put into company 560l. for eight months; B 279l. for ten months, and C 735l. for six months; they gained 1000l. What share of it must each have? For the solution of this question, proceed as follows: A's stock 560l.  $\times$  8 its time = 4480, B's stock 279l.  $\times$  10 its time = 2790, C's stock 735l.  $\times$  6 its time = 4410. Then 4480 + 2790 + 4410 = 11680. Now, 1. To find A's share of the profit, state thus. If 11680l. : 1000l. :: 4480l. which being worked by the rule of three, the answer will be 383l. 11s. 2½d. for A's share of the gain.

2. For finding B's share, state thus, if 11680l. : 1000l. :: 2790l. and working as before directed, the answer will be 238l. 17s. 4½d.

3. To find C's proportion of the gain, say, if 11680l. : 1000l. :: 4410l. then working it by the rule of three; the true amount of his share will appear to be 377l. 11s. 4½d.

Ex. II. Three merchants, A, B, and C, enter into partnership thus; A puts into the stock 65l. for eight months; B puts in 78l. for twelve months; and C puts in 84l. for six months. With this joint stock they traffick, and gain 166l. 12s. 'Tis required to find each man's share of the gain proportionable to his stock and time of employing it.

$$1. A's \text{ stock } 65l. \times 8 \text{ months, the time it was employed} = 520$$

$$2. B's \text{ stock } 78l. \times 12 \text{ months, the time it was employed} = 936$$

$$3. C's \text{ stock } 84l. \times 6 \text{ months, the time it was employed} = 504$$

The sum of all those products is 1960

Then, as before, the several proportions will stand thus:

$$1960 : 166,6 : : 520 : 44,2 = 44l. 4s. \text{ for A's share.}$$

$$1960 : 166,6 : : 936 : 79,56 = 79l. 11s. 2½d. \text{ for B's share.}$$

$$1960 : 166,6 : : 504 : 42,84 = 42l. 16s. 9½d. \text{ for C's share.}$$

The whole gain = 166l. 12s.

**FELON DE SE**, in law, a person who deliberately lays violent hands upon himself.

**FELON**, in law, a person guilty of felony.

**FELONY**, in law, a capital crime, committed with an evil intention, such as murder, theft, suicide, rape, &c.

**FELT**, in commerce, a sort of stuff, that derives

all its consistence merely from being fulled or wrought with lees and size, without either spinning or weaving.

**FELUCCA**, in maritime affairs, a small vessel with six oars, frequent in the Mediterranean.

**FEMME COVERT**, a married woman.

**FEMME SOLE**, an unmarried woman, whose debts, contracted before marriage, become those of her husband after that ceremony is performed.

**FEMININE**, in grammar, one of the genders of nouns, intimating, that the noun belongs to the female sex.

**FEMUR**, in anatomy, the thigh bone.

**FEN**, a general name for boggy or marshy land commonly overflowed with water.

In draining these sort of lands, which is the only method of making them useful, trenches and drains for carrying off the water must be formed, in order to render the surface dry, and of a proper consistence for producing vegetables.

This may be attempted by various methods; but whatever mode of proceeding be adapted, the lowest part of the ground is to be found out first, and the overflowing from great rains, and from land-floods, must be provided for, in the carrying off that way; for, should this be neglected, all the labour and cost employed on the other principle would be thrown away. If it is found that this can be done; there must be afterwards cut a large drain through the middle of the land, and several smaller drains communicating with this.

The great drain must be dug deep enough to drain the whole level; and this, and all the others, must be made the narrowest at the head, and wider all the way to the mouth, where it must be widest of all.

These drains must be all well cleansed from mud and weeds every spring and autumn, and the water from land-floods must be kept from coming in upon these lands, as much as possible, that there may be the less to be drained off; the lower edges of the fen-land must be for this purpose guarded with banks to turn the water into other channels. In Essex, they have many lands that lie below the high-water mark, and are above the low-water mark, and have land-floods or floods running through them, which make a sort of small creek. These lands they have a very easy way of draining, though they are naturally very moist, when they first inclose them from the sea; they do it with a bank, which they extend from one side of the land they design to take in, to the other, excepting a space that they leave, where the creek or land-floods run into the sea. They then prepare a wooden frame, well planked, and of a considerable thickness, fitted to the head of the creek, and capable of shutting it wholly up; in this frame they make several holes, in which are placed wooden troughs, made each of four boards, and suited in size and number to the quantity of water that is to be discharged through them from the land-floods. Each of these trunks is open towards the creek, but on the sea-side it has a door or flap, which opens when the land-flood presses against it, and gives it free passage out; but, when the sea-water is risen to the height of it and presses it, it is shut by the force, and no sea-water is let in. When this head is prepared, they let it in, and, stopping up the whole creek, they continue the banks on each side till they meet it: thus all the land-floods are let out at low water, and not a drop of sea-water can be admitted, so that the lands are kept dry and useful, which were before rendered useless, by being drowned with salt water at every high-water mark. The fresh water of the creek is thus kept unmixed with the sea water, and therefore affords good drink for the cattle, which is commonly very difficult to be had in this sort of lands, the tides spoiling what fresh waters there are, every time they come up.

**FENCE**, in country-affairs, a hedge, wall, ditch, bank, or other inclosure, made around gardens, woods, corn-fields, &c.

The chief reason why woodlands and plantations so seldom prosper, is in a great measure owing to the neglect of fencing them round, to keep out the cattle. This neglect prevails much in the northern parts of this island, though the use of fences is certainly more necessary



fary there than in the south, as the lands require more shelter and warmth. There are several ways of fencing lands, but the usual is that of hedging it with either white or black thorn, crab, holly, alder, or furze, &c. See the article HEDGE.

FENCE-MONTH, the month wherein deer begin to fawn, during which it is unlawful to hunt in the forest.

It commences fifteen days before midsummer, and ends fifteen days after it. This month, by ancient foresters, is called defence-month. There are also certain fence-months, or seasons, for fish as well as wild beasts, as appears by stat. West. 13 Geo. II.

FENCING, the art of making a proper use of the sword, as well for attacking an enemy, as for defending one's self.

Fencing is a genteel exercise, of which no gentleman ought to be ignorant. It is learned by practising with foils, called in latin *rudes*.

FENDERS, among sailors, certain pieces of rope, wood, faggots, or other materials, hung over the side of a ship or boat, to prevent them from striking or rubbing against each other, when they lie close together; also to prevent ships, boats, and other vessels from bearing against a wharf or quay.

FENDUE *en Pal*, in heraldry, a cross clove down in pale, that is, from top to bottom, and the two parts set at some distance from each other.

FENESTRA, in anatomy, a term applied to two openings or foramina within the ear, distinguished by the names of the oval and the round fenestra.

FENNEL *feniculum*, in botany. There are kept two very different sorts of fennel-seeds in the shops, called the common fennel-seed and the sweet fennel-seed. The common kind is of a sharp, biting, and pungent taste; whereas the sweet kind is not only larger and more beautiful, but of a pleasant aromatick sweetish taste, with nothing of the pungency of the other. Sweet fennel-seed is accounted carminative, attenuant, and considerably diuretick and sudorifick, and recommended as a specifick in the measles, small-pox, and malignant fevers. It is also an ingredient in many of the officinal compositions, and in the decoctions for clysters.

Fennel-roots are of the number of the five opening ones of the shops, and prescribed in the same intentions with the seeds. They are likewise said to be great antinephriticks.

FENUGREEK, or FÆNUGREEK, *fœnum græcum*, in botany, is called by Linnæus *trigonella*.

The figure of fenugreek-feed is singular, being irregularly rhomboidal, considerably thick, with a line or depression running obliquely from one of the opposite angles to the other. It is of a pale-yellowish colour, and of an extremely tough and firm texture. It is of a strong and agreeable smell, and of a faint nauseous taste. We have it from Germany.

Fenugreek is used externally on many occasions by way of cataplasim or fomentation; being emollient and discutient in a great degree, and found to give great relief in pains, bruises, &c. It is sometimes also an ingredient in emollient clysters, where anodynes and carminatives are required, without too much pungency. It is also an ingredient in the ointment of marsh-mallows, and some other shop-compositions; but is never given internally.

FERMENT, any body which being applied to another, produces fermentation. See the article FERMENTATION.

Ferments are either matters already in the act of fermentation, or that soon run into this act. Of the first kind are the flowers of wine, yeast, fermenting beer, or fermenting wine, &c. and of the second are the new expressed vegetable juices of summer-fruits.

Among distillers, ferments are all those bodies which, when added to the liquor, only correct some fault therein, and by removing some obstacle to fermentation, forward it by secondary means; as also such as being added in time of fermentation, make the liquor yield a larger proportion of spirit, and give it a finer flavour.

FERMENTATION, the intestine motion excited in vegetables, by which they are changed in such a

manner, that the first thing that rises from them in distillation is acrid, mixible with water, of a warm aromatick taste, inflammable like oil, thin and volatile; or else acid, that will extinguish fire and flame, and is less thin and volatile.

The word is Latin, *fermentatio*, and derived from *fermentum*, leaven.

A certain degree of warmth seems requisite, in the northern climates, to all artificial liquors intended for immediate fermentation, especially in the winter: but the natural juices of vegetables that have never been inspissated, as that of grapes, and other fruits, when fully ripened, will usually ferment as soon as they are expressed, without any external assistance. But as a certain degree of inspissation prevents all tendency to fermentation in vegetable juices, otherwise strongly disposed to ferment; so a long continuance or increase of the inspissating heat especially if it acts immediately, through a metalline or solid body, upon the juice, will destroy its fermenting property; and this the more effectually, as the heat employed approaches to that of scorching, or the degree capable of giving an empyreuma. After the same manner, several experiments make it appear, that there is a certain degree of heat, the continuance, or least increase whereof, proves detrimental, or destructive to fermentation, as there is another that wonderfully encourages and promotes it. These two degrees of heat ought to be carefully noted and settled by the thermometer, or other more certain method, for philosophical and chymical uses; but for common or oeconomicall occasions, they may be limited to what we usually understand by a tepid and a fervid heat: a fervid heat is the banè of all vicious fermentation; as a tepid one, or rather an imperceptible warmth, is the great promoter thereof. In this neutral state therefore, with proper contrivances to preserve and continue it, the liquor is to be put into a suitable vessel for fermentation; at which time, if it work not of itself, it must be quickened by additions; and, in general, by such things as are properly called ferments. See the article FERMENT.

When thus the proper quantity of a good-conditioned and suitable ferment is got ready, it must be put to the fermentable liquor in the bare tepid, or scarce luke-warm state above-mentioned. The best manner of bringing them together, for raising the fermentation quick and strong, seems to be this: when the ferment is solid, it should be broke into small pieces, and gently thinned; with the hand, or otherwise, in a little of the luke-warm liquor: but a complete uniform solution should not be here endeavoured, because this would in some measure weaken the power of the ferment, or destroy its future efficacy. The whole intended quantity therefore, being thus loosely mixed with a moderate quantity of the liquor, should be kept in a tepid state, free from the action of the external air; and at proper intervals more of the warm liquor should be added, till the whole quantity is well set to work together: and thus, by dividing the business into parts, it may be much more speedily and effectually performed.

FERMENTED, in general, something that has undergone a fermentation.

FERN, *Filix*, in botany, the name of a perennial plant, common in most of the commons and waste grounds in England.

FERRET, a small animal, with very red fiery eyes, used by country people in taking of rabbits.

FERRETS, among glass-makers, the iron with which the workmen try the melted metal, to see if it be fit to work:

It is also used for those irons which make the rings at the mouth of bottles.

FERRETTO, in glass-making, a substance which serves to colour glass.

This is made by a simple calcination of copper, but it serves for several colours; there are two ways of making it, the first is this: Take thin plates of copper, and lay them on a layer of powdered brimstone, in the bottom of a crucible; over these lay more brimstone, and over that another layer of the plates, and so on alternately till the pot is full: Cover the pot, lute it well,



place it in a wind furnace, and make a strong fire about it for two hours. When it is taken out and cooled, the copper will be found so calcined, that it may be crumbled to pieces between the fingers, like a friable earth. It will be of a redish, and, in some parts, of a blackish colour. This must be powdered and fitted fine for use.

**FERRUGINOUS**, any thing partaking of iron, or that contains particles of that metal. It is particularly applied to certain mineral springs, whose waters are impregnated with particles of iron, generally called chalybeates.

**FERRUM, IRON.** See the article **IRON**.

**FERTILITY**, that quality, which denotes a thing fruitful or prolific.

**FERULÆ**, in surgery, splinters or chips of different matter, as of wood, bark, leather, paper, &c. applied to bones that have been disjoined, when they are set again.

**FESSE**, in heraldry, one of the nine honourable ordinaries, consisting of a line drawn directly across the shield, from side to side, and containing the third part of it, between the honour point and the navel.

It represents a broad girdle or belt of honour, which knights at arms were anciently girded with.

**FESTINO**, in logick, the third mode of the second figure of syllogism, in which the first proposition is an universal negative, the second a particular affirmative, and the third a particular negative.

**FESTIVAL, or FEAST.** See the article **FEAST**.

**FESTOON**, in architecture and sculpture, &c. an ornament in form of a garland of flowers, fruits, and leaves, intermixed or twisted together. It is in the form of a string or collar, somewhat biggest in the middle, where it falls down in an arch; being extended by two ends, the extremities of which hang down perpendicularly.

**FESTUCA**, in botany, a genus of grasses, the flower of which is composed of two valves, and terminated by a strait awn; the seed is single, oblong, very sharp pointed at each end, and marked with a longitudinal furrow.

**FETLOCK**, in the menage, a tuft of hair growing behind the pastern joint of many horses; for those of a low size have scarce any such tuft.

**FEUD, FEODUM**, the same with fee. See **FEE**.

**FEUDAL, or FEODAL**, denotes any thing belonging to a fee. See **FEE**.

**FEUDATORY, or FEODATORY**, a tenant who formerly held his estate by feudal service.

**FEVER, FEBRIS**, in medicine, a disease, or rather class of diseases, whose characteristic is a preternatural heat felt through the whole body, or at least the principal parts of it. According to Sydenham, a fever is nothing else but the effort of nature, to free herself of morbid matter, which she finds injurious, in order to establish a better health.

If any disease deserves the title of universal it is that of fevers, because it disturbs the whole nervous system, and perverts all the functions of the body, inasmuch that the motion of the heart, arteries, and solids cease to be equal and just; the circulation of the blood and other fluids, to be free and natural; and the salutary secretions and excretions, to be regular; even the mind itself, when ruffled by the febrile onset, is affected with a delirium. Besides, this disease attacks all mankind, of what constitution, sex, or age, in all climates, let their diet and way of living be what they will: sometimes it is epidemick, and seizes many at a time. A fever is not always a primary disease, but is often the symptom of other maladies, as a cachexy, scurvy, phthisis, lues venerea, dropsy, &c. and renders them more cruel and dangerous: however, it is not always pernicious to the human race, but sometimes vanquishes its own cause, and supervening to other diseases, expels them out of the body: thus palsies, epilepsies, convulsions, spasmodick and hypochondriack affections, have been cured by fevers; and many valetudinarians have, by a fever, been restored to a healthful and vigorous constitution. Hence the most general and natural division of fevers, is into essential and symptomatick.

An essential fever is such whose primary cause lies in the blood itself, deriving its original from no other distemper of the solid parts, or any way depending on them; and this is absolutely speaking a fever properly so called.

A symptomatick is a secondary fever, which does not properly subsist of itself, but owes its origin to the disorder of some particular part, and most commonly depends on some remarkable inflammation; from whence proceed the variety of inflammatory fevers, peculiarly so called.

*The general Causes of FEVERS.* The cause of fevers is not heat alone, says Hippocrates, *de vet medic.* but heat and bitterness together, heat and acidity, heat and saltiness, and innumerable other combinations in the blood. It is found, nevertheless, by experience, that some persons, from sound and perfect health, where there has been neither a plethora or any cacochymical dispositions to cause it, have fallen into a fever, because, perhaps, some very extraordinary alteration in the air, or some great change in their way of living, or some considerable error in the fix non-naturals, have happened. Sound bodies may on such occasions, be seized with a fever, only to the end that their blood may acquire a new state and condition, thereby to accommodate itself to the alterations of the air, way of living, &c.

The formal or fundamental cause of a fever, consists in the spasmodick affection, of the whole nervous and fibrous genus which chiefly proceeds from the spinal marrow, and successively from the external to the internal parts: this plainly appears from the usual passions and phenomena of a fever. Hence it naturally follows, that whatever has a power to irritate and sollicit the nervous and vascular system to spasms, is most likely to generate a fever. To this class belong violent passions of the mind, especially terror and anger; a poisonous, subtil, caustick matter, either bred within the body, or received by infection; a stoppage of perspiration; a suppression of critical sweats; eruptions driven back; an abundance of purulent, ulcerous matter, adhering to various parts; aliments over and above acrid and salt; abuse of spirituous liquors; corrupt and bilious crudities lodged in the primæ viæ; excessive watching; a violent pain and tension of the nervous parts; inflammations; tumours and abscesses; hurting the nervous parts by sharp instruments; acrid and corrosive drugs; cold baths; and, on the contrary, those that are too hot or astringent.

According to the different nature of these causes, and their various manner of affecting the nerves, arise fevers of divers kinds: some are benign, others malignant; some are intermitting, others continual; some are simple, others are compound; some are regular, others anomalous; others eruptive, spotted, putrid, hectic, or slow; some admit of an easy cure, others a difficult; some soon terminate, others are protracted a long time, and some again hurry the patient out of the world.

*The general Signs of FEVERS*, are a pain in the back; more particularly about the loins; a coldness, especially of the extreme parts; a shivering; a shaking; trembling; a livid colour of the nails; a subsidence of the vessels of the hands and feet; a shrunk, dry skin; a yawning; a stretching; a pale livid countenance; a trembling and palpitating motion of the heart; an anxiety of the præcordia; difficult breathing; inquietude, restlessness, a sensation of an ebullition of the blood about the heart; a contracted, weak, small pulse; a nausea, and an inclination to vomit; a suppression of perspiration, costiveness, with thin watry urine. When the symptoms are very urgent, and very hastily make their progress, the fever is called acute; when they are more mild and gentle, it is denominated a slow fever.

*The general Cure of FEVERS*, is summarily comprehended in consulting the strength of nature, in correcting and discharging the acrimony from the blood, in dissolving gross humours, and expelling them, and in mitigating the symptoms. If we perceive the symptoms run high, and nature to grow exorbitant, we must moderate it, and enjoin abstinence, a slender diet, .. drinking



drinking water, bleeding, cooling clysters, &c. If nature seems to be too sluggish, she is to be excited by cordials, aromatics, volatiles, &c.

By how much the more acute a fever is, by so much the more sparing and slender ought the diet to be. In fevers, though the patient lies many days without eating any thing, it is no matter: on the contrary, by eating and drinking, the fever would be exasperated.

Vomits in almost all fevers are of advantage, especially in the beginning. Even nature herself teaches us the use of sudorifics; they are most beneficial when the signs of concoction appear; and they are also useful through the whole course of the distemper; yea, even by the promiscuous use of them, fevers are often cured. Spirit of sal ammoniac, or its volatile salt, is esteemed an universal febrifuge, which, being given pretty often, seldom fails of success. All sugared things are very hurtful in fevers.

In acute and inflammatory fevers, but a very few medicines are required; for it will be sufficient diligently to observe the ways that nature aims to relieve herself by, and to forward the cure in those ways, by assisting her. If there be any obstructions in the bowels, we are to take care, by proper evacuations, to remove the load, and by that means take away some of the fuel of the distemper. If the blood be too furiously agitated, we are to quell such an impetuosity: if it be embarrassed with gross and coagulated humours, we are to endeavour at dissolving it, and rendering it more fluid. In the due observation of these three precepts, consists, in a great measure, the whole cure of fevers, where the viscera are sound, and the peccant humours are lodged in the blood, or in the primæ viæ; and then, when nature tends to produce a crisis, or she has already begun it, we are altogether to refrain from the use of medicines, as much as we would avoid the plague.

They are grossly mistaken who, in acute and inflammatory disorders, make use of abundance of medicines so long, till nature, not knowing which way to turn herself, but being variously distracted to and fro, both by the violence of the distemper and the burden of the medicines, is at last forced to yield: for the orderly motion of nature being disturbed and distracted with the repetition of much medicines immethodically given, the fever is not lessened, and the crisis is postponed; and the patient, exposed to a dubious event, either dies, or falls into a chronical distemper.

Therefore, since nature is the physician, it is a pernicious practice to suspend, suppress, or destroy the febrile motions, which have a tendency to health. The most salutary work of nature ought rather to be promoted, which designs, by an increased progressive motion of the fluids, to correct, resolve, and at length to expel the morbid matter. And this is best performed by diluting, moistening, attenuating, aperient, corroborating and nitrous medicines; as also by those which in the time of the intermission, especially tend to promote the proper excretions.

In all fevers, the drinking plentifully of warm weak liquors, is attended with many good consequences: the patient is always refreshed by it; the febrile heat is mitigated, and rest is promoted; and the proper and necessary sweats forwarded. Among these liquors, the common barley-water, teas made of sage, mint, balm, &c. with the milder alexipharmick roots, are most proper: with these powders are to be given, composed of the absterfivè and digestive salts: they should be sated with lemon-juice, and then mixed with a little nitre, and may be given every three, four, or six hours, as the urgency of symptoms may require. Emulsions of sweet almonds, and the cooling feeds, are also very proper between whites.

The medicines by which the physician is to assist nature in her business of excretion, are the gentle diaphoreticks; among which the diaphoretick antimony, when duly prepared, holds a very high place: alexipharmicks, which have also a diuretick virtue, such as the mixtura simplex, when faithfully prepared and lightly camphorated, are very proper. All violent medicines are to be dreaded in fevers. Acids in general,

are by many much dreaded, but there is no real ground for this; on the contrary, in sanguineous fevers, during the time of the violent heat, and immoderate thirst, they are found of the greatest use and benefit. The use of astringent medicines, though too common, yet is extremely improper in all fevers. Nitre is an admirable remedy for fevers in general.

*The general Crisis of FEVERS.* Whereas there is no fever cured without some considerable evacuation, raised either by nature or by art, the physician ought carefully to observe which way nature seems to intend the expulsion of the morbid matter, and assist her by all possible means. Now this expulsion is frequently made through several outlets of the body at a time, and an evacuation by one outlet, more or less, checks that by another: thus a looseness checks sweat, and *vice versa*. Wherefore it is the physician's business to consider what evacuation is most likely to be of service, and so to promote this, as to give the least interruption possible to any other, for any one evacuation is not equally suitable to all persons, both on account of the difference of constitutions, and of diseases; although evacuations through every emunctory, are sometimes necessary, as we find by experience in malignant fevers.

But of all solutions of the disease, the most desirable is by sweat; next to that by stool and urine: the worst is by an hæmorrhage, whether it proceeds from the nose or from any other part, because it indicates that the blood is so far vitiated, that no proper separation of the humour can be made.

Lastly, some fevers terminate in abscesses, formed in the glands, which, if they happen in the decline of the disease, and suppurate kindly, are salutary. Wherefore the suppuration is to be forwarded by cataplasms, or plaisters; and sometimes by cupping on the tumour; and then, if the abscess do not break spontaneously it ought to be opened, either with a knife, or with a caustick. At this time this rule of practice is generally right, not to exhaust the patient's strength by evacuations of any kind. And yet in some cases there is a necessity for drawing a little blood, as when the humours are in great commotion, and the heat excessive: for this remedy prudently administered, makes the tumour ripen kindly, because nature has always a great abhorrence of a turbulent state.

But in order to give a more distinct notion of the several kinds of fevers, it will be necessary to treat them particularly.

*Bilious FEVER*, is that occasioned by the over-copiousness or bad qualities of the bile. See *BILE*.

Concerning the bilious fever, which Dr. Pringle says is epidemick in marshy countries and camps, he observes, that it begins with chilliness and lassitude, pains in the head and bones, and a disorder at the stomach. At night the person gets no rest, and often becomes delirious; but, generally, in the morning, an imperfect sweat brings on a remission of all the symptoms. In the evening, the paroxysm returns, but without any cold fit, and is commonly worse than before. On the second morning, it remits as before; and these periods go on daily, till it insensibly changes either into a continued or an intermitting shape.

The doctor enumerates other symptoms of this terrible disease, as crudeness of his urine, bilious stools, costiveness, &c. and observes, that its cure, before it becomes continued, is to be attempted by evacuations, the neutral salts, and the bark. Bleeding he judges indispensable, which should be repeated once or oftener, according to the urgency of the symptoms. After bleeding, it is proper to give an emetick, during the remission of the fever; but if the stomach be inflamed, vomits are dangerous, and therefore ought never to be given. Ipecacuanha, he observes, is the safest and easiest, but antimonials make the most efficacious vomits. If the body remains costive, it is proper to open it by lenient physick. He likewise recommends salt of wormwood, lemon-juice, spiritus mindereri, and the bark; which last ought not to be given till the urine breaks, and the intermissions take place. Bleeding and purging are also necessary before the bark is given, which he thinks answers best in substance, administered



ered in rhenish wine, after standing a night in infusion.

If it changes into a continued fever, bleeding becomes necessary; and blisters are not only useful, but the very best remedy: to these may be joined the neutral salts, and diaphoretick powders.

The doctor further observes, that though a sweat be the proper crisis, it ought never to be promoted by theriaca or the like hot medicines; unless the pulse should sink, and the petechiæ, or other bad symptoms appear: in which case, the warmer alexipharmicks are highly necessary, as the disease has then changed into a malignant fever.

*Burning FEVER, Causus*, attacks the patient with great fury and rage, with an excessive burning heat, an intolerable thirst, and other symptoms demonstrating a great and remarkable inflammation of the blood: the respiration is thick, difficult, and quick; the tongue is dry, yellow, parched and rough; there is a loathing of food, a nausea and vomiting, a little cough, a delirium, a coma, convulsions, and other symptoms already mentioned.

On the third and fourth day it often proves mortal; it seldom exceeds the seventh, if violent.

It is often terminated by an hæmorrhage, which, if small on the third and fourth day, is a fatal sign. A solution of this fever, on a critical day, may also be by vomiting, stool, sweat, urine, and spitting thick phlegm. If the exacerbation of this disease happens on the second or fourth day it is a bad sign, on the sixth not so bad.

As to the cure of a burning fever, so far as it differs from the general treatment already prescribed, bleeding is necessary at the beginning, if there is a plethora, or signs of particular inflammation; or the heat intolerable, or the rarefaction too great, or a revulsion necessary, or the symptoms urgent, and not to be vanquished any other way.

Soft diluting, laxative, antiphlogistick, cooling clysters are to be repeated as often as the heat, costiveness, and revulsion require them; the whole body is to be moistened by receiving into the nostrils the steam of warm water, by washing the mouth, throat, feet, and hands with the same; and by fomenting with warm sponges the places where the vessels are most numerous. Purgatives are dangerous before the crisis, but clysters may be used made of milk, honey, and a little nitre. After the crisis, which is known by the sediment of the urine, laxatives made with tamarinds, manna, rhubarb, raisins, or cream of tartar, are necessary. If a phrensy happen, cause bleeding of the nose, by thrusting up a straw, or with a scarifying knife: use also frictions of the feet and legs, with hot cloths.

*Catarrhal FEVER*, may be reckoned in the class of slow fevers, which, in the beginning is attended with a catarrh, a coryza, cough, hoarseness, &c. These fevers are most commonly gentle and slow by day-time, generally somewhat worse in the evenings: they are attended with a great weariness of the limbs, the symptoms continue with an increase of the coryza and cough, until the distemper arises to its highest pitch, when the matter of the catarrh is ripened, and the mucus, becoming thicker, is discharged, and the fever ceases; the seat of this distemper is in the conglobate glands.

In a catarrhal fever a decoction of assafras wood is convenient, with liquorice roots and raisins, on account of the acrimony of the humours. Also the expressed juice of turneps, with a little sugar; volatiles and sudorifics, a solution of gum ammoniac.

*Colliquative FEVER*, is that in which the body is much emaciated, and consumed in a short space of time, the solid parts, and the fat itself wasted, sometimes by a diarrhœa, sometimes by sweat, by urine, or by feverish heats alone, without any sensible discharge. A colliquative fever is observed to accompany a cancer of the breast, with a diarrhœa. See the articles DIARRHŒA, DIABETES, CANCER, &c.

For this disease, emulsions of almonds, and of the four cold seeds, as also ass's, goat's, or woman's milk, are proper, or cow's milk with the juice of water-

crosses; chicken broth, broth made of river crabs, or wood snails bruised.

*Nervous FEVER*, at first affects the patient with a slight, transient chilliness, several times in a day; also with uncertain flushes of heat, a listlessness, lassitude, and weariness.

The patient has a dryness of the lips and tongue, without any considerable thirst: they have frequent nausea, with reaching to vomit, but little brought up: the breathing is difficult by intervals, and especially towards night: there is an exacerbation of the symptoms, with a low, quick, and unusual pulse: the urine is pale, and made often, and suddenly: a torpor or obtuse pain and coldness often affect the hind part of the head, or a heavy pain is felt along the coronary suture. The pulse is very remarkable in this disease, for it is generally low, quick and unequal.

Gilehrift makes this state previous to the fever, and says, that for a fortnight, or three weeks, before they are laid down, they shall be low-spirited, inappetent, loaded, sleep ill, sigh frequently, groan involuntarily, and feel inexpressible disorder, accompanied with fear, concern, and dejection, and perhaps slight alienations of mind. The same author says, that this disorder is frequently occasioned by people exposing themselves indiscreetly to the sun, or by being fatigued in it; by eating largely of fruit, or drinking bad wine; or by being long under a course of anxiety, care, fear, discouragement, and other enervating passions, together with irregularities of diet, &c. It commonly attacks people of weak nerves, and a lax habit of body, and is occasioned by an acrimony that gives an universal stimulus.

The cure is to be performed with gentle volatile medicines of the cordial and diaphoretick kind, in order to promote perspiration, by the application of blisters, and by a proper regimen and method of diet. In the beginning a gentle emetick may be given, or a small dose of rhubarb; when it has continued long, bleeding and sweating is very prejudicial. In giving the diaphoretick, we should always have regard to the urine, for if that from being pale gradually heightens to an amber colour, we are right in our dose, especially if, in bed, a gentle dew or moisture comes on, without a restlessness. A little chicken broth is of service, both as food and physick, especially towards the decline of the disorder. Also, thin jellies of hartshorn, sago, panado, adding a little wine to them; at this also, if the sweats are copious and weakening, 'tis proper to give small doses of the tincture of the bark, with saffron and snake-root, interposing now and then a dose of rhubarb, to carry off the putrid colluvies.

*Slow FEVER*, much resembles the hectic fever, but has milder symptoms, and a gentler heat than the hectic. See the article *HECTICK*.

This fever is attended with profuse sweats after sleeping; after which, and before noon, the pulse is natural, as in the hectic; but there is not such a want of appetite, nor excessive weakness, nor dryness of the skin, nor such dark coloured urine, nor such danger, as in the hectic.

The cause of a slow fever lies mostly in the fluids. It arises from obstinate intermittent, or continual fevers; from the small-pox and measles; from profuse hæmorrhages; from long diarrhœas, dysenteries; from an excessive salivation, gonorrhœa, or fluor albus; from care, watching, intense study, hard, continual labour, inordinate coition, or the abuse of spirituous liquors. In the cure of this disease respect must always be had to the cause. If it proceeds from crudities, it is known by a languid feebleness, internal heat, propensity to sweat, especially in the balls of the hands, and soles of the feet; in which case the stomach and parts adjacent must be cleansed from the sordes by a gentle vomit of ipecacuanha. After the alimentary canal is cleansed, you must proceed to analepticks and stomachicks.

If the disorder is in the hypochondria, when the patient is plethorick, cacochemical, cachectical, or scorbutical, or the menses or hemorrhoidal evacuations are stopped, and occasion this disorder; or, if it proceeds from voraciousness, or bad diet, or the abuse of spirituous



ous liquors, then endeavours must be made to free the liver, spleen and mesentery, and its vessels and glands from obstructions: for this purpose mineral waters are proper; as are also the thermæ, or hot bath waters. Where these cannot be had a decoction of thin veal broth, with the roots of succory, fennel, asparagus, dog-grass, and viper's grass are proper; drinking a quart a day for some weeks; and before it some preparations of steel, as the tincture of steel, or of martial flowers. If from an erosion of the stomach and bowels, all sharp, salt, and stimulating things are as bad as poison. In this case a decoction of saffraas, and the bark of Eleutherius in milk, as also chamomile flowers, and the tops of yarrow, drank about a quart a day, are of great use: as are also the root of marshmallows, or rice boiled in milk; or gum dragant, dissolved in water.

If from the loss of necessary fluids, and want of strength, then it may be termed a colliquative fever, and must be treated as already directed in the treatment of that fever above.

If it proceeds from the abuse of spirituous liquors, all heating liquors should be avoided, as also analepticks and stomachicks. Gruel will be proper, with succory root, red poppy flowers, and some stibiated nitre.

If this fever proceeds from a suppression of the menses, it requires immediate bleeding in the foot, and resolvent decoctions of succory-roots, leaves of sowthistles, daisies, and elder-flowers, forbearing all strong emmenagogues.

If from a marasmus senilis, and that the patient has been addicted to a sedentary inactive life, his appetite remaining good, and has omitted accustomed bleeding, or the spontaneous evacuations of blood are ceased, bleeding is indicated, and wholesome diluters must be freely drank, abstaining from food of too plentiful nourishment, and using convenient exercise: but if the disorder proceeds from a plenty of impure salt serum, not secreted through the skin, or otherwise, the sordes must be carried off by gentle laxatives of manna, rhubarb and raisins, and the rorcid juices must be renewed by jellies and ass's milk.

*Yellow Fever.* See the article *BILIOUS FEVER*.

*FEVERS of Children* are all owing to acidity, the primary cause of all the disorders that affect them; and the whole cure depends upon vanquishing that enemy.

This is to be done two ways, the first is to prepare the acidity, and render it fit for expulsion; and then to purge it away by suitable evacuants. To prepare the acid does not require sudorificks, but absorbents; and though these are numerous, the powder of crab's claws is the chief. Purging to some may seem dangerous, but Sydenham has shewn us, that it is safe and salutary in the fevers of adults, insomuch that he depends entirely upon it for the cure of the epidemick winter-fever; and it has been found of excellent use in the fevers of children. They recommend in this case a pearl julep, made by adding a dram of prepared pearls to two ounces of the simple waters, and two drams of the compound; the dose is three spoonfuls. When there are any unusual symptoms arising from putrid humours, they prescribe about six grains of æthiops mineral the night before the purge, in a small spoonful of any agreeable sirup. After the purge, the testaceous powders are to be given three or four times in 24 hours for two days and nights, and then the purge is to be repeated.

*FEVERFEW*, in botany, a genus of umbelliferous plants, with compound radiated flowers, which appear in June, and ripen their seeds in October.

The plant which has a very strong smell, grows well in several parts of England. The leaves and flowers of feverfew are reckoned excellent in hysteric and uterine disorders. They form a good carminative, strengthen the stomach, and assist digestion.

*FIAF*, in law, a short order or warrant, signed by a judge, for making out and allowing certain processes.

*FIBER*, in zoology, the beaver. See *BEAVER*.

*FIBRE*, in anatomy, a fine slender body resembling a thread, and serving to form other parts.

*FIBRE*, also implies a slender filament, the basis of other bodies, whether animal, vegetable or mineral.

*FIBRILLA*, a very minute or slender fibre.

VOL. I. No. 31.

*FIBROSE*, something consisting of fibres.

*FIBULA*, in anatomy, the outer and smaller bone of the leg. See the article *SKELETON*.

*FICUS*, the fig-tree, in botany, a genus of polygamious plants, producing male and female apetalous flowers: the stamina are three setaceous filaments, topped with twin antheræ, and the female flowers have an inflexed style, terminated by two acuminate reflexed stigmas: the fruit is a large fleshy turbinate receptacle, the interior sides of which support the flowers, which are inclosed within it, and is properly nothing but a common calyx, or the cup of the fructification.

Fig-trees are propagated either by layers or suckers; those which are layed from fruitful branches are to be preferred, for those which are raised from suckers are generally spongy, and are not only apt to produce little or no fruit, but being fuller of sap than the layers, are also liable to suffer by frosts in the climate. With us fig-trees are generally planted and trained against walls, but they will do very well in standards, they may also be planted in espaliers, where their large leaves will entirely hide disagreeable objects; and in order to secure them from being damaged in severe frosts, this is a very convenient form for protecting them with reed pannels, matts, &c. This last method we think the best, as they will produce greater quantities of figs than those against walls, which frequently come out before the severity of the season is over.

The season for pruning fig-trees is either in autumn or the spring, we think the month of February the best, as at that season it is discoverable what branches have escaped the winter, when they may be pruned accordingly, training them regularly at about a foot asunder, but they should not be shortened, as the fruit is produced at the extremities of the branches; though it is not amiss, where the branches are luxuriant, to pinch the end off, this will cause them to bleed, and may be a means of checking their growth, so as to produce branches more fit for bearing.

Figs, as well fresh as when dry, are very wholesome food: they are nutritive and emollient: they are good also in the disorders of the breast and lungs; but it is to be observed, that a too free use of them has sometimes brought on obstructions of the viscera, which are very common complaints also where they are eaten as food, as they are with bread by the poor people in many parts of the Levant. They are frequently made ingredients in our pectoral decoctions, and are by some greatly recommended against nephritick complaints. They are much used externally by way of cataplasm, either roasted or boiled in milk, for the ripening of tumours, and for easing the pain of the piles. Figs should be chosen large, of a pale brownish colour, soft and mellow, heavy, and when broken, with the pulpy substance yellowish and sweet; and of a soft glutinous texture.

*FIDD*, among sailors, a piece of wood or iron thrust through a hole in the foot of a top-mast, after it is drawn up to its utmost height.

It is used to keep steady the top-mast above the frame of the top, as it is kept steady below by the trussel-trees: the fidd rests upon the trussel-trees, and with it of course the whole weight of the top-mast: the fidd-hole is therefore just above them when the top-masts are erect.

*FIDE JUSSOR*, among civilians, the same with a surety.

*FIELD*, *Campus*, in agriculture, a piece of ground inclosed, whether for tillage or pasture.

*FIELD*, in heraldry, is the whole surface of the shield, or the continent, so called because it containeth those achievements anciently acquired in the field of battle. It is the ground on which the colours, bearings, metals, furs, charges, &c. are represented. Among the modern heralds; field is less frequently used in blazoning than shield or escutcheon.

*FIELD BOOK*, in surveying, that wherein the angles, stations, distances, &c. are set down.

*FIELD COLOURS*, in war, are small flags about a foot and a half square, which are carried along with



the quarter-master general, for marking out the ground for the squadrons and battalions.

**FIELDFARE**, in ornithology, the English name of the variegated turdus, with a hoary head.

It is larger than the common black-bird; and with us is a bird of passage, coming over in great numbers in the winter.

**FIELD-PIECES**, small cannons, from three to twelve pounders, carried along with an army in the field.

**FIELD-STAFF**, a weapon carried by the gunners, about the length of a halbert, with a spear at the end; having on each side, ears screwed on, like the cock of a match-lock, where the gunners screw in lighted matches, when they are upon command; and then the field-staffs are said to be armed.

**FIELD-WORKS**, in fortification, are those thrown up by an army in besieging a fortress, or by the besieged to defend the place. Such are the fortifications of camps, highways, &c.

**FIERI FACIAS**, in law, a writ that lies where a person has recovered judgment for debt or damages in the king's courts against one, by which the sheriff is commanded to levy the debt and damages on the defendants goods and chattels.

**FIFE**, in musick, is a sort of wind-instrument, being a small pipe.

**FIFTH**, in musick, the same with a diapente. See the article **DIAPENTE**.

**FIG**, the fruit of the ficus or fig-tree. See **FIGUS**.

**FIGHT**, in military affairs, an engagement between two armies. See the article **BATTLE**.

*Sea* **FIGHT**, in maritime affairs, an engagement at sea; either between two fleets of ships of war, galleys, or even between single ships.

In an engagement of ships of war, the fleets are drawn up in two parallel lines upon a wind. The ships keep close to the wind on the line they are formed in, and are commonly at a cable's length distance one from the other; the fire-ships, transports, tenders, &c. keeping at half a league distance on the opposite side of the enemy. This form was observed, for the first time, in the famous battle of the Texel, where the Duke of York defeated the Dutch, on the 13th of June, 1665.

It is probably the most expedient method, as proved by experience, to keep a constant fire on the enemy, by firing in platoons, which will have a much greater effect, and distress them more, than the common received notion of broadside and broadside, with some intervals between, which is generally the case in most actions; in order to which, divide the guns into five fires, in the following manner, viz. half the guns abaft below, then half the guns abaft aloft, so the other half below forward; and, lastly, the quarter-deck guns, and those on the fore-castle; so that, by the time the first platoon is fired, a constant fire may be kept on the enemy; which method is to be preferred to broadside and broadside, where chance has often a greater share in the execution than judgment; notwithstanding, this last method is sometimes necessary, as time and circumstances may offer. It is likewise adviseable to point the guns, so as to make a breach in the enemy's ship.

The chief judgment of an admiral is to form his line in a proper disposition and strength from the van throughout to the rear; in doing which, particular regard must be had to make the centre strong; for if that is forced, or broke through, the battle is looked upon as lost. Here it is to be observed, that, in a sea-action, the centre is made the strongest, whereas, in a land-fight, it is the weakest; and the wings of an army are strongest, lest the enemy, by forcing a wing, should have the advantage of flanking, and consequently putting the line in disorder: for the same reason also, the van and rear of a fleet is not put into confusion, because care is taken to make them proportionably strong, to resist the enemy: therefore the weakest part of the line will be in the quarters, supported each way from the centre throughout.

The signal being made for battle, each division, and every captain crowds into his proper station without loss of time: they endeavour to approach each other till with-

in point-blank gun-shot, which is near enough for a line of battle; for if too near, the line will naturally fall into a curve, notwithstanding all endeavours to the contrary; besides, the line cannot be so well observed: the enemy may intercept the sight, especially if the line be long, which may cause a mistake in the signals. It would be better for the contending admirals in chief, that each had a view of his own line, as well as that of the enemy, in order to make proper signals; and, if any distress happen, to be the better able to relieve, or if any advantage, to improve upon it.

The battle being begun, the fate of war decides the day. In a word, the success of all depends upon placing the shot-well, and preserving a proper disposition in the line. There is one maxim that should always be observed; that is, that bravery and resolution are absolutely necessary in the first sort of engagement, viz. between single ships; and conduct and bravery in the second sort, viz. that between two squadrons.

**FIGURATIVE**, or **FIGURATE**, what expresses something by obscure resemblance; and is chiefly applied to the types and mysteries of the Mosaic law; as also to any expression which is not taken in its primary and natural sense.

**FIGURATIVE**, is used in the Greek grammar for what we otherwise call characteristick, viz. a letter which characterises certain tenses of the Greek verbs, and that specifies and distinguishes them.

**FIGURATIVE Counter-point**, in musick, is that where there is a mixture of discords with concords.

**FIGURE**, in philosophy, the surface of terminating extremities of any body.

**FIGURE**, in geometry, the superficies included between one or more lines, of which there are three sorts, as rectilinear, curvilinear, and mixt figures: rectilinear have their extremities all right-lines, as triangles, quadrilaterals, &c. Curvilinear, are such as have their extremities crooked, as circles, ellipses, &c. Mixt, are partly right-lines and partly crooked, as a semicircle, segment of a circle, &c.

**FIGURE**, in painting, is applied to those lines that form the representation of a man or other animals, &c.

**FIGURE**, in architecture, the representation which is made by solid bodies; such are statues of bronze, marble, &c.

**FIGURE**, in heraldry, the pieces with which a shield is charged, as a cross, a human face, the sun, &c.

**FIGURE**, in logick, is applied to certain methods of forming syllogisms, as to the disposition of the three terms, that is, of the medium with the two terms of the conclusion.

There are generally reckoned three figures: the first where the middle term is the subject of the major proposition, and predicate of the minor. By this figure all conclusions, whether universal or particular, affirmative or negative, may be proved. In the second figure, the middle term is the predicate of both premisses, namely, of the major and minor; and this only admits of negative conclusions. The third figure requires that the middle term be the subject of the major and minor: this admits only of particular conclusions.

The special rules of these three figures are; in the first the major proposition must always be universal, and the minor affirmative:—In the second, the major must be universal; and one of the premisses, together with the conclusion, must be negative.—In the third, the minor must be affirmative, and the conclusion always particular. Some reckon a fourth figure, called Galenick, from Galen, where the middle term is predicated in the major, and subjected in the minor; but this is a very indirect manner of concluding, and is only a mere inversion of the first figure. *Watt's Logick.*

**FIGURE**, in rhetoric, an ornament or turn of expression different from what we use, when we speak plainly and without any particular emotion. The principal of these are, exclamation, apostrophe, epanorthosis, doubt, metaphor, allegory, &c. *Furetiere.*

**FIGURE**, in grammar, an expression deviating from the common rules, in order to follow a shorter and more elegant turn. Sometimes, in ancient authors, these figures are real oversights. The most exact grammarians



marians reckon four, the ellipsis, pleonasmus, syllepsis, and hyperbole; to these some add antiptosis and enallage.

**FIGURE**, in fortification, the plan of any fortified place, the interior polygon; of this there are two sorts, regular and irregular; a regular figure is that where the sides and angles are equal; and irregular is the contrary.

**FIGURE**, in astrology, is applied to the description, state, and disposition of the heavens at a certain hour, where the places of the planets and stars are marked in a figure of twelve triangles called houses, with regard to the horoscope to be drawn from it. They likewise call it horoscope and celestial Themis.

**FIGURES**, in arithmetick, are certain characters whereby we denote any number, which may be expressed by any combination of the nine digits, as 1, 2, 3, 4, 5, 6, 7, 8, 9, and 0.

**FIGURE**, in conick sections, according to Apollonius, is the rectangle of the latus rectum and transversum in the hyperbola and ellipsis. De la Hire calls the rectangle of any diameter and its proper parameter, in the hyperbola and ellipsis, the figure of that diameter.

**FIGURE Plane**, or *plane Surface*, is that which is terminated by right-lines only.

**FILAMENT**, a fine thread or fibre, of which the bodies of animals and vegetables are composed.

**FILAMENTS**, among botanists, signify the stamina of flowers. See **STAMINA**.

**FILAZER**, or **FILACER**, an officer of the Common Pleas, so called, because he files those writs on which he makes process.

**FILBERT**, the fruit of a species of the hazle-tree, cultivated in gardens. The nuts should be sown in February, and the ground kept clear of weeds till the plants have attained a sufficient height; after which they will require no further care.

**FILE**, among mechanicks, a well known instrument, used in a great variety of trades, in cutting, smoothing, &c. different sorts of metals.

**FILE**, in military affairs, a row or rank of soldiers standing one behind another.

**FILIGRANE**, or **FILIGREE-WORK**, any piece of gold or silver work, curiously formed, with grains or drops on the filaments or threads.

**FILIPENDULA**, dropwort, a genus of plants, the corolla of which consists of five or more oblong, obtuse, plane, open petals, inserted into the calyx: there is no pericarpium, except the crusts of the seed; the receptacle is globose; the seeds are oblong, acuminate, and disposed in a circular manner.

This plant is a diuretick: it is recommended against colicks, flatulencies, and the fluor albus: but its chief use consists in stopping too great a flow of the lochia.

**FILIX**, in botany, an order of the cryptogamia class of plants, comprehending the fern, horse tail, adder's tongue, maidenhair, spleenwort, polypody, &c.

**FILLET**, in anatomy, the same with frænum. See the article **FRÆNUM**.

**FILLETT**, or **FILET**, in architecture, a little square member, ornament, or moulding, used in divers places, and upon divers occasions, but generally as a crowning over a greater moulding.

**FILLET**, in heraldry, a kind of orle or bordure, containing only a third or fourth part of the breadth of the common bordure. It is supposed to be withdrawn inwards, and is of a different colour from the field.

**FILLET**, in painting, gilding, &c. is a little rule or reglet of leaf-gold, drawn over some mouldings, or on the edges of frames, pannels, &c. especially when painted white by way of enrichment.

**FILLET**, in the menage, the loins of an horse, which begin at the place where the hinder part of the saddle rests.

**FILLER-HORSE**, one yoked immediately to a cart.

**FILLY**, a term among horse-dealers, to denote the female or mare colt.

**FILM**, a thin skin or pellicle. In plants it is used for that thin, woody skin, which separates the seeds in the pods, and keeps them apart.

**FILTER**, or **FILTRE**, in chymistry, a strainer commonly made of bibulous or filtering paper in the form of a funnel, through which any fluid is passed, in

order to separate the gross particles from it, and render it limpid.

There are several filters made of flannel and linen-cloth.

**FILTRATION**, in chymistry, the act of passing a fluid through a filtre.

**FIMBRIÆ**, denotes appendages disposed by way of fringe round the border of any thing: such are those about the thicker extremities of the fallopian tubes.

**FIMBRIATED**, in heraldry, an ordinary with a narrow bordure or hem of another tincture.

**FIN**, *Pinna*, in natural history, a well known part of fishes, consisting of a membrane supported by rays, of little bony or cartilaginous officles.

**FINAL**, in general, whatever terminates or concludes a thing.

**FINAL LETTERS**, among Hebrew grammarians, five letters so called, because they have a different figure at the end of words from what they have in any other situation. These are caph, mem, nun, pe, and tzade.

**FINANCES**, in the French polity, signify the revenues of the king and state.

**FINE**, in law, hath divers applications; sometimes it is used for a formal conveyance of lands or tenements, or of any thing inheritable, being *in esse tempore finis*, in order to cut off all controversies. Others define it to be a final agreement between persons, concerning any lands or rents, &c. of which any suit or writ is depending between them in any court.

**FINE** sometimes signifies a sum of money paid for entering lands or tenements lett by lease; and sometimes a pecuniary mulct for an offence committed against the king and his laws, or against the lord of the manor.

**FINE** *adnullando levato de tenemento quod fuit de antiquo dominico*, is a writ of the justices for disannulling a fine levied of lands holden in ancient demesne to the prejudice of the lord.

**FINE** *capiendo pro terris*, &c. a writ lying for one that, upon conviction by a jury, having his lands and goods taken into the king's hands, and his body committed to prison, obtains favour for a sum of money, &c. to be remitted from his imprisonment, and his lands and goods to be redelivered to him.

**FINE** *Force*, an absolute necessity that is unavoidable, whereby one is compelled to do any thing.

**FINE** *levando de tenementis tentis de rege in capite*, &c. a writ directed to the justices of the Common-Pleas, to license them to admit of a fine for sale of lands holden in capite.

**FINE** *non capiendo pro pulchre placitando*, a writ to inhibit officers of courts to take fines for fair pleading.

**FINE** *pro rediffessina capienda*, &c. a writ that lies for the release of one laid in prison for a replevin, upon a reasonable fine.

**FINE** *for Alienation*, a reasonable fine paid the king by his tenants in chief, for license to alienate their lands.

**FINERS** of Gold and silver, are those who separate these metals from coarser ores. See **ASSAYING**.

**FINERY**, in the iron works, denotes one of the forges, at which the iron is hammered and fashioned into what they call a bloom or square bar.

**FINITE**, something bounded or limited, in contradistinction to infinite.

**FIRE**, a general name, by which men seem to understand a certain sensation or complex notion of light, heat, burning, melting, &c.

The power of fire is so great, its effects so extensive, and the manner of its acting so wonderful, that some of the wisest nations of old revered and worshipped it, as the supreme deity. Some of the chymists also, after they had discovered its surprising operations suspected it to be an uncreated being: and indeed the most famous of them have acknowledged it as the source of all their knowledge; and hence have professed themselves philosophers by fire, nor thought they could be honoured with a nobler title. Now, amongst all the wonderful properties of fire, there is none more extraordinary than this, that though it is the principal cause of almost all the sensible effects that continually fall under our observation, yet it is itself of so infinitely a subtle nature, that it baffles or defeats the most sagacious enquiries, nor ever comes within



within the cognizance of our senses. Fire is generally divided into three kinds or species, viz. celestial, subterraneous, and culinary.

By celestial fire is principally understood that of the sun, without regard to that of the fixed stars, though this perhaps may be of the same nature.

By subterraneous fire we understand that which manifests itself in fiery eruptions of the earth, volcanoes, or burning mountains; or by any other effects it produces in mines, or the more central parts of the earth.

By culinary fire we mean that employed in all chymical operations, and the common occasions of life.

The sun's heat appears to be the actuating principle, or general instrument of all the operations in the animal, vegetable, atmospherical marine, and mineral kingdoms.

Fire, considered in itself, seems to exist in the greatest purity and perfection in the celestial regions; at least we are insensible of any considerable smoke it yields: for the rays of light come to us from the sun, unmixed with any of that gross, feculent, or terrestrial matter, found in culinary and subterranean fires: but, allowing for this difference, the effects of the solar fire appear the same as those of culinary fire.

If we examine the effects of subterraneous fires, we shall find them the same with those produced by culinary fire. Thus, burnt coals, cinders, and melted minerals, are thrown up by Vesuvius and other burning mountains. Warm nephritical exhalations, natural hot springs, steams, vapours, smoke, &c. are found in several parts of the globe, rising nearly in the same manner as if they were produced by the heat of a furnace. Whence it appears, that subterraneous fires are of the same nature with the culinary.

Bacon, in the treatise *De Forma Calidi*, deduces from a great number of particulars, that heat in bodies is no other than motion, so and so circumstanced; so that to produce heat in a body, nothing is required but to excite a certain motion in the parts thereof.

Boyle seconds him in an express treatise of the mechanical origin of heat and cold, and maintains the same doctrine with new observations and experiments; as a specimen of which, we shall here give the two following:

1. In the production of heat, says that able philosopher, there appears nothing on the part either of the agent or patient, but motion and its natural effects. When a smith briskly hammers a piece of iron, the metal thereby becomes exceedingly hot; yet there is nothing to make it so, except the forcible motion of the hammer impressing a vehement and variously determined agitation on the small parts of the iron, which, being a cold body before, grows by that super-induced commotion of its small parts, hot: first, in a more loose acceptation of the word, with regard to some other bodies, compared with which it was cold before; then sensibly hot, because this agitation surpasses that of the points of our fingers; and in this instance oftentimes the hammer and anvil continue cold after the operation; which shews that the heat acquired by the iron was not communicated by either of those implements, as heat; but produced in it by a motion, great enough strongly to agitate the parts of so small a body as the piece of iron, without being able to have the like effect upon so much greater masses of metal as the hammer and the anvil: though if the percussions were often and briskly renewed, and the hammer were small, this also might be heated: whence it is not necessary that a body itself be hot to give heat.

2. If a large nail be driven by a hammer into a plank of wood, it will receive several strokes on its head before it grows hot; but when it is once driven to the head, a few strokes suffice to give it a considerable heat; for while, at every blow of the hammer, the nail enters further into the wood, the motion produced is chiefly progressive, and is of the whole nail tending one way; but when that motion ceases, the impulse given by the stroke being unable to drive the nail further on, or break it, must be spent in making a various, vehement, and intestine commotion of the parts among themselves, wherein the nature of heat consists.

Agreeable to this is the opinion of Sir Isaac Newton,

who conceives that gross bodies may be converted into light, by the agitation of their particles; and light, again, into gross bodies, by being fixed therein.

On the other hand, M. Homberg, in his *Essai du Souffre Principe*, holds, that the chymical principle, or element sulphur, which is supposed one of the simple, primary, pre-existent ingredients of all natural bodies, is real fire, and consequently that fire is coeval with bodies.

Dr. s'Gravesande goes on much the same principle: fire, according to him, enters the composition of all bodies, is contained in all bodies, and may be separated or procured from all bodies, by rubbing them against each other; and thus putting their fire in motion: but fire, he adds, is by no means generated by such motion.

Mr. Lemery, the younger, agrees with these two authors in asserting this absolute and ingenerable nature of fire: but he extends it further. Not contented to confine it as an element to bodies, he endeavours to shew, that it is equally diffused through all space, and that it is present in all places; in the void spaces between bodies, as well as in the insensible interstices between their parts.

This last sentiment falls in with that of Boerhaave, and the celebrated M. Musschenbroek. But notwithstanding what those able philosophers have advanced, it is evident that fire, heat, flame, &c. are only the different modifications of the particles of light, and that the particles of light themselves depend entirely on velocity for their lucid quality; since, by many experiments, we know, that the particles of bodies become lucid, or particles of light, by only producing in them a requisite degree of velocity: thus the particles in a rod of iron, being hammered very nimbly, shine and become red-hot; thus also the violent stroke of the flint against the steel, in striking fire, puts the particles of the steel, which it takes off, into such a motion as causes them to melt and become red-hot, which makes the sparks of fire produced by each stroke: as, therefore, fire consists in the great velocity of the particles, so it may be communicated from one body in which it is, to another in which it is not, after the same manner that one body in motion will communicate motion to another that has got none.

Fire differs from heat only in this, that heat is a motion in the particles of a body, with a less degree of velocity; and fire a motion with a greater degree of velocity, viz. such as is sufficient to make the particles shine; though we often call such a state as will burn, fire, though it does not actually shine; and we seldom call those lucid bodies fires, which only shine, and do not burn. These are a sort of phosphori, which, though they have no heat, yet seem to owe their lucidity to the motion of their parts. See the articles *HEAT* and *PHOSPHORUS*.

There seems to be no other difference between fire and flame, than this, that fire consists in a glowing degree of velocity in the parts of a body, while yet subsisting together in the mass; but flame is the same degree of velocity in the particles dissipated and flying off in vapour: or, to use Sir Isaac Newton's expression, flame is nothing else but a red-hot vapour. See the article *FLAME*.

*FIRE*, in chymistry, the great instrument by which most of the operations in that art are performed.

The kind, degree, direction, &c. of fire, are things the chymist is principally to attend to. There are, in chymistry, as many kinds of fire as there are mediums through which it may be conveyed, or fuels that afford it.

*Degrees of FIRE.* The last thing to be considered is, how to regulate and ascertain the degrees of fire in chymical operations, so as to produce the effects required in every case. The common directions of chymists about this matter are full of uncertainty; the first, second, third, and fourth degrees of heat, or fire, meaning no precise degrees, measured by any standard; however, according to Boerhaave, they are as follow:

The first degree of fire is that by which nature performs the office of vegetation in plants, and whereby chymistry imitates or does the like: this commences

from



from the highest degree of cold, which, in Fahrenheit's thermometer, is denoted by one, and ends at eighty degrees; since in this whole interval we find certain plants give indications of life and growth. This heat is suited to extracting of the native spirits of odoriferous vegetables with oils, as that of roses, jessamin, &c. and again, to making the more curious insolutions, &c.

The second degree of fire may be accounted that of the human body, in a healthy state. This degree is always greater than that of the ambient air, and may be supposed to commence at the 40th degree of the thermometer, and end about the 94th. Within this compass animals may live and subsist, that is, if their juices be of any degree of heat within these bounds. This degree is adapted to vinous and acetous fermentation, putrefaction, exclusion of the chick, the finer digestions, the making of tinctures and elixirs; and the adepts have used it for the first digestion of their mercury, by carrying the including vessel constantly in their pocket.

The third degree of fire is that which extends from 94 degrees of the thermometer to 212, at which last, water usually boils. This degree is required in the distillation of simple and compound waters, the essential oils of vegetables, and will coagulate or consolidate the serum, blood, and other animal juices, and consequently destroy the creatures.

The fourth degree may be taken from 212 to 600 of the thermometer, within which latitude quick-silver or oil of vitriol boils, distils, or becomes volatile. This degree is suited to the melting of lead, tin, bismuth, &c. and the subliming of sal ammoniac and sulphur, the calcining of antimony, &c.

The fifth degree is that wherein the other metals melt, and which commences from 600 degrees of the thermometer, and ends where iron is held in a state of fusion. In this degree most bodies are destroyed; but glass, gold, silver, copper, and iron, remain long unchanged; all other fixed bodies grow red-hot in this degree, and all the unvitriifiable stones are calcined.

The sixth and highest degree of fire, hitherto known, is that of the burning lens, or concave, by M. Villette, Tschirnhausen, Buffon, and others. The focus of these lenses will even volatilize what is called the metalline or mercurial part of gold, and vitrify the more terrestrial. See the article BURNING-GLASS.

The fires of sand, filings of iron, and ashes, have generally their degrees from the first to the third: the reverberatory fire has its degrees from the first to the fourth: the ignis rotæ serves for calcinations and fusions; and a vessel may receive different degrees of heat from a lighted lamp: the balneum mariæ and balneum vaporis have also their degrees: as has the fire of suppression its degrees: insolation has its degrees in proportion to the heat of the sun, to which the substances are exposed: the bath of horse-dung has its degrees according to the bulk of the heap, or the place in which it is lodged: the bath of grape-skins has also its degrees like that of the bath of horse-dung: and the heat of quick-lime has also its degrees; for according as we desire it more or less strong, we expose it to powder longer or shorter in the open air; and when we have occasion for all its heat, we use it as quick as we possibly can.

*St. Anthony's FIRE*, in medicine. See the article ERYSIPELAS.

*FIRE*, in the art of war, a word of command to the soldiers, to discharge their muskets; to the cavalry, to discharge their carbines or pistols; to the grenadiers, to fire their grenades; and to the gunners, to fire the guns.

*Running FIRE* is when a rank of men, drawn up, fire one after another; or, when the lines of any army are drawn out to fire on account of a victory, each squadron or battalion takes it from another, from the right of the first line to the left, and from the left to the right of the second line.

*FIRE-ARMS*, are all sorts of arms charged with powder and ball, as cannon, muskets, carbines, pistols, blunderbusses, &c.

*FIRE-ARROWS*, certain destructive instruments

used by privateers to set fire to the sails of the enemy: they are shot from a musketoon or swivel-gun; and being furnished with springs to prevent their going entirely through the sails; a match, being previously dipt in sulphur and nitre, is wound about the shaft of the arrow, which is iron, and this match catches fire, upon the explosion, and sets fire to the sails.

*Wild-FIRE*, a kind of artificial or factitious fire, which burns under water, and even with a greater violence than when out of it.

It is composed of sulphur, naphtha, pitch gum, and bitumen; and is only extinguishable by vinegar, mixed with sand and urine; or with raw hides.

The inventor, according to the Jesuit Petavius, was an engineer of Heliopolis, in Syria, named Callinicus, who first applied it in the sea-fight commanded by Constantine Pogonates against the Saracens near Cyzicus, in the Hellespont: and with such effect, that he burnt the whole fleet therewith, wherein were thirty thousand men.

*FIRE-WORKS*. See the article PYROTECHNY.

*FIRKIN*, an English measure of capacity for liquid things, containing a fourth part of the barrel. The firkin of ale is eight gallons, and that of beer nine. The firkins of soap and of butter are of the same dimensions as those of ale.

*FIRMAMENT*, in the old astronomy, the eighth sphere or heaven, with regard to those of the seven planets which it surrounds. Besides the diurnal motion, according to Ptolemy, given it by the primum mobile, from E. to W. round the poles of the equator, it has an opposite motion to this, from W. to E. upon the poles of the ecliptick, called the secondary motion. By this the fixed stars advance, according to the order of the signs, about one degree in 70 or 72 years. More properly the firmament is that space expanded above us in the heavens.

*FIRMNESS*, in philosophy, implies the consistence of a body or that state wherein its sensible parts were, or are united together, so that the motion of one part induces a motion of the rest.

The firmness of bodies is owing to the cohesion of their parts, and is opposed to fluidity.

*FIRST-FRUIT*S, *Primitiæ* or *Annates*, are the profits accruing from every benefice for one year, given before the reformation to the pope, but translated by 26 Henry VIII. to the crown; by which act, whoever enters on a spiritual living, before he pays or compounds for the first-fruits, forfeits, on conviction, the double value thereof.

Every clerk, therefore, must go himself with a friend, or send two friends to the first-fruit's office in London, and there enter into bond to pay the first-fruits within two years next ensuing, at four equal half-yearly payments; only one tenth of the whole, according to the book of rates, which are unalterable, to be deducted, as that must be paid by itself the first year. The successor is chargeable with arrears of tenths due from his predecessor, and is impowered, by 27 Henry VIII. to distrain his predecessor's goods upon the benefice; and hath likewise a good action at law against him or his executor. By 2 Q. Anne, the first-fruits of all benefices are settled upon a corporation for the maintenance of poor clergy, and is called the corporation of the queen's bounty.

*FIR-TREE*, *Abies*, in botany. See ABIES.

*FISCK*, *Fiscus*, in the civil law, the treasury of a prince of state, to which whatever falls to the publick is appropriated.

*FISH*, in natural history, an animal which lives in the water, that being its native element.

Willoughby, after Aristotle, has accurately distinguished fishes into *cetaceous*, *cartilaginous*, and *spinous*.

The *cetaceous*, called also *belluæ marinæ*, have lungs, and breathe like quadrupeds; they copulate also like them, and conceive and bring forth their young alive, which they afterwards suckle with their milk.

The *cartilaginous* sort are those produced from eggs like large birds; which are also excluded the womb like those of birds.

The *spinous* kind are also oviparous; but their eggs



are smaller, and they have spinæ up and down in their flesh to strengthen them.

FISH, among seamen, a machine for drawing up the flocks of the anchor to the davit. See DAVIT.

It is composed of four parts, viz. the hook, the pendant, the block, and the tackle.

The pendant is a piece of strong rope passing through the block, hung over the end of the davit, which projects out from the forecastle to keep the anchor at a distance from the ship's side, that the flocks may not tear it as they are drawn up: at one end of the pendant is fastened the hook, which is of sufficient strength and capacity to grapple the flocks under water, and sustain their weight: at the other end of the pendant is fixed the tackle, which is a complication of pulleys, to perform this operation.

FISHES of the *Mast*, certain pieces of wood hollowed on one side, and convex on the other, fastened securely on the masts of a ship to strengthen them, either when it is apprehended there is a necessity for this additional support to bear an extraordinary pressure of sail; or after they may have sustained some damage from a former occasion.

FISH-PONDS, those made for the breeding or feeding of fish.

Fish-ponds are no small improvement of watery and boggy lands, many of which are fit for no other use. In making of a pond, its head should be at the lowest part of the ground, that the trench of the flood-gate, or sluice, having a good fall, may not be too long in emptying. The best method of making the head secure, is to drive in two or three rows of stakes above six feet long, at about four feet distance from each other, the whole length of the pond head, whereof the first row should be rammed at least about four feet deep. If the bottom is false, the foundation may be laid with quicklime, which slacking, will make it as hard as a stone. Some lay a layer of lime, and another of earth dug out of the pond, among the piles and stakes; and when these are well covered, drive in others, as they see occasion, ramming in the earth as before, till the pond-head be of the height designed.

The dam should be made sloping on each side, leaving a waste to carry off the over-abundance of water in times of floods or rains; and as to the depth of the pond, the deepest part need not exceed six feet, rising gradually in shoals towards the sides, for the fish to sun themselves, and lay their spawn. Gravelly and sandy bottoms, especially the latter, are best for breeding; and a rich soil with a white fat water, as the washing of hills, commons, streets, sinks, &c. is best for fattening all sorts of fish. For storing a pond, carp is to be preferred for its goodness, quick growth, and great increase, as breeding five or six times a year. A pond of an acre, if it be a feeding and not breeding one, will every year feed 200 carps of three years old, 300 of two years old, and 400 of a year old. Carps delight in ponds that have marl or clay bottoms, with plenty of weeds and grass, whereon they feed in hot months.

Your pond should be drained every three or four years, and your fish sorted. If it is a breeding one, the smaller ones are to be taken out to store other ponds with, leaving a good stock of females, at least eight or nine years old, as they never breed before that age. In feeding ponds, it is best to keep them pretty near of a size.

FISHERY, a place where great numbers of fish are caught.

The principal fisheries for salmon, herring, mackrel, pilehards, &c. are along the coasts of England, Scotland, and Ireland; for cod on the Banks of Newfoundland; for whales, about Greenland; and for pearls, in the E. and W. Indies.

FISHERY denotes also the commerce of fish, more particularly the catching them for sale.

FISSURE, *Fissura*, a chaps or crack, in surgery, is either natural or morbid: thus, the mouth, &c. is frequently called a natural fissure; morbid fissures are either those of the cranium or other bones, or chaps of the skin, which sometimes happen about the lips, anus, and other parts of the body.

The word is Latin, *fissura*, and derived from *findo*, to split or cleave.

FISSURE, in philosophy, is frequently applied to those divisions that are to be met with between layers of different kinds of earth or stone.

FISTULA, in surgery, a deep, narrow, and callous ulcer, generally arising from abscesses or ulcers.

FISTULA in *Ano*, in surgery, an abscess running upon or into the intestinum rectum; though an abscess in this part, when once ruptured, does generally, if neglected, grow callous in its cavity and edges, and becomes, at last, what is properly called a fistula.

FISTULALACHRYMALIS, a disease which attacks the great caruncle in the inward corner of the eye. See EYE.

FISTULAR, or FISTULOUS, appellations given by surgeons to wounds and ulcers, which degenerate into fistulas.

FISTULAR, among botanists, is applied to leaves and flowers that are tubular, or resemble a hollow pipe.

FIT, in medicine, denotes much the same with paroxysm. See PAROXYSM.

FITS of *easy Reflection and Transmission*, in opticks: See the articles REFLECTION and TRANSMISSION.

FITCHEE, in heraldry, a term applied to a cross; when the lower end of it is sharpened into a point.

FITTING-OUT, in the sea language, the act of providing a ship with a sufficient number of men to navigate her; also with provisions of all sorts, artillery, ammunition, masts, yards, sails, cordage, anchors, and other furniture; also the rigging and securing her masts against the dangers of the wind and sea.

FIXATION, in chymistry, the rendering any volatile substance fixed, so as not to fly off upon being exposed to a great heat; hence,

FIXED BODIES are those which bear a considerable degree of heat without evaporating, or losing any of their weight.

FLACCIDITY, among physicians, a disorder of the solids, cured by astringent and cardiack medicines, joined with exercise and good air.

FLAG, in the sea language, the banners or colours by which an admiral is distinguished at sea.

FLAGS in the *British Navy* are either red, white, or blue; and they are hoisted either at the heads of the main-mast, fore-mast, or mizen-mast.

Flags, when displayed from the top of the main-mast, are the distinguishing marks of admirals; when from the fore-mast of vice-admirals; and when from the mizen-mast of rear-admirals.

The highest flag in the British navy is the anchor and rope, which is only displayed when the lord high admiral, or lords commissioners of the admiralty are on board; the next is the union, the distinction peculiar to the second officer, called admiral of the fleet; and the lowest flag is the blue, at the mizen-mast.

FLAGELLANTES, WHIPPERS, in church history, certain enthusiasts in the 13th century, who maintained that there was no remission of sins without flagellation, or whipping. Accordingly they walked in procession, preceded by priests carrying the cross, and publicly lashed themselves till the blood dropped from their naked backs.

FLAGEOLET, or FLAYOLET, a little flute, used chiefly by shepherds and country people. It is made of box, or other hard wood, and sometimes of ivory, and has six holes besides that at the bottom, the mouth-piece, and that behind the neck. See the article FLUTE.

FLAKE, among gardeners, a kind of striped carnations, with only two colours.

FLAMBEAU, a kind of large taper, made of hempen wicks, by pouring melted wax on their top, and letting it run down to the bottom. This done, they lay them to dry: after which they roll them on a table, and join four of them together by means of red-hot iron; and then pour on more wax, till the flambeau is brought to the size required.

FLAME, *Flamma*, in physiology, the small parts of an inflammable or considerably unctuous body, that are set on fire, or briskly agitated and thrown off, with a certain vibrative motion at the surface of that body into the open air: or, in Sir Isaac Newton's words, the flame



of a body is only the smoke thereof heated red-hot; and the smoke is only the volatile part of the body separated by the fire.

**FLAMEN**, in Roman antiquity, the name of an order of priests, instituted by Romulus or Numa; authors not being agreed on this head.

**FLANCH**, **FLANQUE**, or **FLASQUE**, in heraldry, an ordinary always borne double, being the segment of a circular superficies.

**FLANNEL**, or **FLANEL**, a loose sort of woollen stuff not crossed, and wove on a loom with two treddles, like bays.

**FLANK**, in the menage, the side of a horse between the ribs and haunches.

**FLANKS of an Army**, are the troops encamped on the right and left, as the flanks of a battalion are the files of the right and left.

**FLANK of a Bastion**, in fortification, that part which joins the face to the curtain. See the article **BASTION**.

**Oblique FLANK**, or **Second FLANK**, that part of the curtain from whence the face of the opposite bastion may be discovered.

**Retired FLANK**, or **Low FLANK**, or **Covered FLANK**, one of the platforms of the cazemate.

These retired flanks are at a great defence to the opposite bastion, and the passage of the moat, because the besiegers cannot see nor easily dismount their guns. The curtain is esteemed the strongest part of the fortification, because flanked at both ends, and the face is accounted the weakest, having only one defence from the opposite flank.

**FLATS**, in musick, additional notes, which, together with sharps, serve to supply the defects of musical instruments.

**FLATULENCY**, in medicine, a disorder of the bowels arising from a weak stomach, and crude flatulent aliment, as pease, beans, lentils, coleworts, hard fat flesh, &c. which degenerates into wind, creating great anxiety if not evacuated, and difficulty of breathing.

Another cause of flatulencies are congestions of blood in the branches of the vena porta; whence proceed anxieties of the præcordia, difficult breathing, colick pains, heart-burn, head-achs, vertigo, and watchfulness.

If the flatulency arises from crudities in the stomach, evacuations are first of all necessary; after which may be given bitters, aromatics, carminatives, and strengtheners, with a spare diet and exercise. If it proceeds from congestions of blood, as is the case of hypochondriacks, a vein must be opened; and if the body is costive, an emollient clyster or a gentle laxative will be proper. If these fail, chalybeate medicines are to be called in, as tincture of vitriol, of iron, steel-filings finely powdered, from six to ten grains, or oil of cinnamon with sugar or bitters, spaw-waters, and constant exercise.

**FLAX**, the name of a plant cultivated both for the sake of its stalk and seed, the former being used in making linen, and the latter for oil.

The stem of this plant, which is round and hollow, grows to the height of about two feet, and then divides into several branches: these are terminated by blue flowers, consisting of five petals, and are succeeded by capsules divided within into ten cells, in each of which is inclosed a bright, slippery, elongated seed. Its leaves are long, narrow, sharp-pointed, and placed alternately along the stem and branches.

The soil for flax should be a stiff loam, rendered fine by tilth, and situated in a valley bordering upon water; or such a soil as is thrown up by rivers. If there be water at a small depth below the surface of the ground, it is thought still better, as is the case in Zealand, which is remarkable for the fineness of its flax, and where the soil is deep and stiff, with water almost every where, at the depth of a foot and a half or two feet underneath it. It is said to be owing to the want of this advantage, that the other provinces of Holland do not succeed equally well in the culture of this useful plant; though fine flax is also raised on high lands, if they have been well tilled and manured, and if the seasons are not very dry.

If the flax be pulled before the blossom falls, it heckles away almost to nothing; and, though in appearance very

fine, yet it has no substance, and the yarn spun of it is weak and ouzy: it not only wastes in the washing, but the linen made of it grows extremely thin in the bleaching. The pluckers should be nimble, tie it up in handfuls, set them up till perfectly dry, and then house them. Flax pulled in the bloom, proves whiter and stronger than if left standing till the seed is ripe; but then the seed will be lost. An acre of good flax, is accounted worth from seven to twelve pounds, or more.

*Dressing of FLAX.* When flax has been watered, and twice swingled, as directed under the articles **WATERING** and **SWINGING**, it is then to be heckled in a much finer heckle than that used for hemp. Hold the strike of flax stiff in your hand, and break it very well upon the coarse heckle; saving the hurds to make harden cloth of. This done, the strike is to be passed through a finer heckle, and the hurds coming from thence saved for middling cloth, and the tear itself for the best linen.

But to dress flax for the finest use of all, after being handled as before, and laying three strikes together, plat them in a plat of three rows, as hard and close together as you can, joining one to the end of another, till you have platted as much as you think convenient; then begin another plat, and add as many several ones, as you think will make a roll; afterwards, wreathing them hard together, make up the roll; which done, put as many as you judge convenient into a hemp-trough, beat them soundly, rather more than you do hemp. Next open and unplat them, dividing each strike very carefully from each other; and so strike it through the finest heckle of all, whereof there are three sorts. Great care must be taken to do this gently and lightly, lest what is heckled from thence should run to knots; for if preserved soft like cotton, it will make a very good linen, each pound running at least two yards and an half. The tear itself, or finest flax, will make a strong and very fine holland, running at least five yards in the pound. See the article **SPINNING**.

In Scotland, they have a lint-mill, which greatly facilitates the dressing of flax; which if done by the hand, will cost 32d, the stone; whereas it may be dressed at the mill for 2s. the stone, which is one fourth saved.

**FLEA**, *Pulex*, in zoology, a genus of insects without wings, of a roundish, compressed figure: the legs are three pair, and formed for leaping: the eyes are two, and simple: the mouth is bent downwards: the colour is a deep purple, approaching to black.

The flea is an insect which infests birds as well as quadrupeds, and lay eggs, called nits: these produce a kind of nymphs, or white worms; which after some time are transformed, in the manner of caterpillars, into perfect fleas.

**FLEA-BANE**, in botany, a name given to the plant called by authors conyza. It got the name of flea-bane from its supposed virtue of killing fleas.

**FLEA-BITTEN**, that colour of a horse which is white or grey, spotted all over with dark redish spots.

**FLEAM**, in surgery and farriery, an instrument for bleeding men or cattle.

**FLEECE**, the covering of wool, shorn off the bodies of sheep. See the article **WOOL**.

*Order of the Golden FLEECE*, an order of knighthood instituted by Philip II. duke of Burgundy. These knights were at first 24, besides the duke himself, who reserved the nomination of six more; but Charles V. increased them to 50. He gave the guardianship of this order to his son Philip, king of Spain; since which, the Spanish monarchs are chiefs of this order. The knights had three different mantles ordained them; at the grand solemnity, the collar and fleece.

**FLEET**, in naval affairs, a company of ships of war, or merchantmen, or both, bound on any particular expedition or voyage.

In sailing, a fleet of men of war is usually divided into three squadrons; the admiral's, the vice-admiral's, and the rear-admiral's squadron, all which, being distinguished by their flags and pendants, are to put themselves, and as near as may be, to keep themselves in their customary places, viz. the admiral with his squadron, to sail in the van, that he may lead the way to all



all the rest in the day-time, by the sight of his flag in the main-top-mast-head; and in the night-time, by his lights or lanterns. The vice-admiral and his squadron is to sail in the centre, or middle of the fleet. The rear-admiral, and the ships of his squadron, to bring up the rear. But sometimes other divisions are made, and those composed of the lighter ships and the best sailors, are placed as wings to the van, centre and rear.

For the disposition of a fleet in the time of an engagement with the enemy, see FIGHT.

FLEETING, among sailors, changing the situation of a tackle, when the blocks or pulleys are drawn together: the use of fleeting is to separate the powers which produce any great effort, that the force may be increased, which is destroyed by their meeting.

FLEMISH, or the FLEMISH TONGUE, is that which we otherwise call Low-Dutch, to distinguish it from the German, of which it is a corruption, and a kind of dialect.

FLEMISH BRICKS, a neat, strong, yellow kind of bricks, brought from Flanders, and commonly used in paving yards, stables, &c. being preferable for such purposes to the common bricks. See BRICK.

FLESH, *Caro*, the soft, fibrous, and bloody part of any animal body; among anatomists, it signifies only the red part, or the belly of a muscle.

FLESH, among botanists, the pulp or eatable part of any fruit, inclosed between the outer rind and stone.

FLESH-COLOUR. See the article CARNATION.

FLEXIBLE, in philosophy, is applied to bodies capable of being bent or diverted from their natural figure or direction.

FLEXION, in anatomy, is the motion by which the arm, or any other member of the body, is bent. It is also applied to the muscles, nerves, &c.

FLEXOR, in anatomy, a name applied to several muscles, which are so called from their office, namely, to bend the part to which they belong.

FLINT, *Silex*, in natural history, a semi-pellucid stone, composed of crystal debased with earth, of one uniform substance, and free from veins; but of different degrees of colour, according to the quantity of earth it contains, and naturally surrounded with a whitish crust.

Oil of FLINTS, a name given to the liquor obtained from a mixture of four ounces of calcined and powdered flints, with twelve ounces of salt of tartar; this being melted together in a strong fire, runs into glass, which is to be powdered and set in a cellar, where it runs into an oil per deliquium.

FLOAT of a Fishing-Line, the cork or quill that floats or swims above water.

FLOAT, also signifies a certain quantity of timber bound together, in order to be conveyed down a river; and sometimes to carry burdens down the stream.

FLOAT-BOARDS, those boards fixed to water-wheels of undershot mills, in order to receive the impulse of the stream, by which the wheel is carried round.

FLOOD, a deluge or inundation of water. See the article DELUGE.

FLOOKING, among miners, implies a peculiarity in the load of a mine. It is observed that the load or vein of ore is frequently intercepted in its course by the crossing of a vein of earth or stone, or some different metallick substance; as in which case the load is moved to one side, and this transient part of the land is called a flooking.

FLOOR, in architecture, the under side of a room, or that part we walk on.

FLOOR, in ship-building, the bottom of a ship, or all that part on each side of the keel, which approaches nearer to an horizontal than a perpendicular situation; whence it is common to say, a sharp floor, a flat floor, a long floor, &c. whence,

FLOOR-TIMBERS, are those which are placed immediately across the keel, upon which the bottom of the ship is framed, and the upper parts of the timbers are constructed. See the article TIMBER.

FLORAL, in general, something belonging to a flower. See the article FLOWER.

Thus floral leaves are those found only near flowers.

FLORAL GAMES, in Roman antiquity, annual games instituted in honour of the goddess Flora, which began to be celebrated on the 4th of the calends of May, or the 28th of April, and were continued to the calends, or first of May.

FLORID STYLE, is that too much enriched with figures and flowers of rhetoric.

FLORIN, is sometimes used for coin, and sometimes for a money account. See COIN and EXCHANGE.

FLORINIANS, *Floriniani*, in church history, a sect of hereticks, of the second century, so denominated from their leader Florinus, who made God the author of evil. They are a species of the gnosticks, but deny the judgment and resurrection, and hold that our Saviour was not born of a virgin.

FLORIST, *Florista*, according to Linnæus, is an author, or botanist, who writes a treatise called Flora, comprehending only the plants and trees to be found growing naturally in any place. However, in the more common acceptation of the word, florist signifies a person well skilled in flowers, their kinds and cultivation.

FLORY, FLOWRY, or FLEURY, in heraldry, a cross that has the flowers at the end circumflex and turning down.

FLOS, or FLOWER, in botany. See BOTANY.

FLOS, in chymistry, the most subtle part of bodies separated from the more gross parts by sublimation, in a dry form.

FLOSCULOUS, among botanists, an appellation given to compound flowers made up of a number of less ones, all inclosed in the same common cup. The plants with flosculous flowers make one of Tournefort's classes, called by Linnæus syngenesia.

FLOTA, a name given to a number of ships which get before the rest in their return, and give information of their departure and cargo of the flota and galleons.

FLOTSON, is the wreck of ships which afterwards float on the water. This belongs to the lord-high-admiral, by his letters patent.

FLOWER, *Flos*, that part of a vegetable which is commonly distinguished from the other parts by particular colours, and is for the most part annexed to the embryo of the fruit, and seems formed to prepare the nutritive juices for these embryo's, and begin the disclosing of their parts. The flowers of plants, according to Dr. Grew, have commonly the empalement, foliation, and attire. In most plants there is a perianthium, calyx or flower-cup, at the bottom of the flower.

Mr. Ray reckons that every perfect flower must have petala, stamina, apices, and the stylus. He also divides the perfect flowers of plants, even if without stamina, 1. Into simple flowers, which do not consist of other smaller ones, and which usually have but one single style. 2. Compounded, aggregated, or composite flowers, which consist of several little flosculi, yet so as to make but one flower. Simple flowers are monopetalous, the body of the flower being of one entire leaf, though sometimes cut a little way into many seeming leaves, as borage, bugloss, &c. or polypetalous, which have distinct petala or leaves, and those falling off singly, and not altogether, as the seeming petala of the monopetalous flowers always do. And both these he divides into uniform and difform flowers. The former have the right and left hand parts, and the forward and backward parts of the flower all alike. But those of a difform flower have no such regularly, as sage, dead-nettle, &c. A monopetalous difform flower he also divides into,

1. Semistylar, that is, such whose upper part resembles a pipe cut off obliquely, as in the aristolochia.

2. Labiate; and this either with one lip only, as in the acanthum and scordium; or with two lips, as in the greatest part of labiate flowers. And here the upper lip is turned upwards, and so turns the convex part downwards, as in the chamæcissus, &c. But most commonly the upper lip is convex above, and turns the hollow part down to its fellow below, representing a helmet or monk's hood. And hence these are called galeate, cucullate, and galericulate flowers; such are the flowers of the lamium and most verticillate plants. Sometimes also the labium is entire, and sometimes jagged or divided.

3. Corniculate,



3. Corniculate, that is, such hollow flowers as have on their upper part a kind of spur, or little horn, as in the linaria, delphinium, &c. And the corniculum or calcar is always impervious at the tip or point.

Compounded flowers are either,

1. Discous, or discoidal, that is, whose little flosculi are set together so close, thick, and even, as to make the surface of the flower plain and flat; and which therefore, on account of its round form, resembles a discus; which discus is sometimes radiated, when there are a row of the petala standing round in the disk like the points of a star, as in the matricaria, chamæmelum, &c. Sometimes naked, that is, having no such radiating leaves round the limb of its disk, as in the panacetum.

2. Planifolious, which is composed of plain flowers set together in whole rows round the centre, and whose face is usually indented, notched, uneven, and jagged, as the hieracdia, sonchi, &c.

3. Fistular, which is compounded of several large, hollow, little flowers like pipes, all divided into large jaggs at the ends.

4. Imperfect flowers, because they want the petala, are called staminous, apetalous, and capillaceous. And those which hang by fine threads like the iuli, Tournefort calls amentaceous, and we, cats-tails. The same writer uses campaniformes to denote such flowers as are in the shape of a bell; and infundibuliformes for such as are in the form of a funnel. He also distinguishes some difform monopetalous flowers by the name of personati, that is, such as express the gaping mouths of animals; and distinguishes these from what he calls labiati, in that the style or pistillum of those does not end in a capsula seminalis, as it does in the others.

FLOWER, in architecture, according to Vitruvius, is a representation of some imaginary flower, by way of crowning, or the top of a dome, &c. The moderns generally use, instead of this ornament, a vase, ball, or the like.

FLOWER of the Capital, in architecture, is an ornament resembling a rose, in the middle of the sweep of the Corinthian abacus.

FLOWING SHEET, among seamen, implies the ship's sailing with a fair wind; because then the sheets or ropes fastened to the leeward corners of the sails are not drawn so tight as when she is close hauled.

FLOX, among dyers, implies wool thoroughly cleaned, which they use to absorb the colouring particles of cochineal.

FLUENT, in fluxions, the flowing quantity, or that which is continually either increasing or decreasing, whether it be a line, a surface, or a solid.

FLUID, in physiology, an appellation given to all bodies, whose particles yield easily to the least impressed force. See HYDROSTATICKS and HYDRAULICKS.

FLUOR ALBUS, in medicine, a discharge of a whitish, gleety matter, from the natural parts of the fair sex.

FLUSH-DECK, in ship-building, the upper-deck of a vessel, which has no rising at either extremity, except the common curve, which rises gradually from the middle towards the stem and stern.

FLUTE, a kind of musical wind instrument, which was one of the most common among the ancients, and used in their choruses, theatres, amphitheatres, sacrifices, &c. pretty much resembling the modern flute, though sometimes we meet with it crooked at the end. There were three sorts of it, the tibia, fistula, whence the name of flute, and the avena. The tibia was anciently made of the shank-bone of a horse, dog, or crane. The fistula was a kind of flagelet: the avena was anciently made by shepherds of a reed of oats. It is certain the avena is taken for the fistula, and the other two are used promiscuously. Many flutes on marble seem to be made of wood, some of metal. In sacrifices, and the bacchanalia we meet with minstrels playing on two flutes at once, which was more frequent than the single flute. In all appearance, the two pipes were separate, though they might be united at the end in the player's mouth; but the figures of all these minstrels have a pipe in each hand. The flute had anciently three holes, afterwards

nine, and then ten, which they played upon, as at present.

FLUTES, or FLUTINGS, in architecture, are perpendicular channels or cavities cut along the shaft of a column or pilaster. Vitruvius supposes they were first introduced in imitation of the plaits of women's garments. They are chiefly affected in the Ionick order, where they had their first rise, though indeed they are used in all the richer orders, as the Corinthian and Composite, but seldom in the Dorick, and scarce ever in the Tuscan. Each column has 24 flutes, and each flute is hollowed exactly a quadrant of a circle; but the Dorick has but 20 flutes. Between the flutes are little spaces which Vitruvius calls striæ, and we, lists; though in the Dorick the flutes are frequently made to join each other, without any intermediate space, the list being sharpened off to a thin edge, which forms a part of each flute.

FLUTES, in botany, imply the stems and fruits of certain plants, which have furrows analogous to those of columns.

FLUX, in medicine, is sometimes taken for all kinds of defluxions, and in this sense is the same as catarrhysis or catarrhus; sometimes it bears a restrained sense, as the flux of the belly, an hepatick flux.

FLUX, in hydrography, a regular periodical motion of the sea, which happens twice in 24 hours, whereby it rises and is driven violently against the shore. It is one of the motions of the tide, called the flow, or tide of flood; the other motion by which the water sinks and retires, is called the reflux, ebb, or tide of ebb: there is always a kind of apparent stand about a quarter of an hour between the flux and reflux. See TIDE.

FLUX, in chymistry, a preparation which facilitates the fusion of ores, and the harder metals.

Fluxes are reducible to two general kinds, the vitreous and the saline: the vitreous is that which either has of itself, or readily assumes, a glassy form in the fire; among the principal whereof is reckoned the glass of lead, the glass of antimony, and borax. By the saline kind is understood that which is composed of salts, whether tartar, nitre, fixed alkali, or the like. And among the principal of this kind is reckoned the black flux, sandiver, kelp, &c.

The vitreous kind seems more immediately destined to act upon the stony or vitrescible matter, wherewith stubborn ores are frequently mixed; and the saline kind to act more immediately upon the ore itself, for the due separation of the metal. The more kindly ores require no flux to make them run thin, or to yield all the metal they contain. And sometimes ores are so kindly as to contain their own fluxes within themselves. Thus, upon barely grinding some copper ore to powder, and melting it in a common wind furnace, it has yielded more pure metal at the first operation, than could be obtained from it by means of the usual fluxes: so that artificial fluxes are chiefly for the stubborn or less tractable ores. And these are sometimes so exceedingly hard to fuse, that it requires the utmost power of art to treat them advantageously in the larger way of business, where no considerable expence can be allowed for fluxes. Hence many mines remain unwrought, as being untractable without great charges; so that the improvement of the business of fluxes, to render them cheap and effectual, might greatly advance metallurgy. The matter in soft ores which renders them so fusible has been found by experiment upon copper ore to be a kind of bituminous substance, capable of melting by a strong heat into a soft and black kind of glass.

FLUXION, in mathematicks, denotes the velocity by which the fluents or flowing quantities increase or decrease; and may be considered as positive or negative, according as it relates to an increment or decrement.

The doctrine of fluxions, first invented by sir Isaac Newton, is of a great use in the investigation of curves, and in the discovery of the quadratures of curvilinear spaces, and their rectifications. In this method, magnitudes are conceived to be generated by motion, and the velocity of the generating motion is the fluxion of the magnitude. Thus, the velocity of the point that describes a line, is its fluxion, and measures its increase or decrease. When the motion of this point is uniform,

its



its fluxion or velocity is constant, and may be measured by the space described in a given time. But when the motion varies, the fluxion or velocity at any given point is measured by the space that would be described in a given time, if the motion was to be continued uniformly from that term.

Thus, let the point  $m$  be conceived to move  
 $A \quad m \quad m \quad r$   
 $\quad \quad \quad | \quad \quad | \quad \quad \quad \text{-----}$   
 $\quad \quad \quad \quad \quad \quad \quad \quad \quad \quad B$

from  $A$ , and generate the variable right line  $A m$ , by a motion any how regulated; and let its velocity, when it arrives at any proposed position or point  $R$ , be such as would, was it to continue uniform from that point, be sufficient to describe the line  $R r$ ; in the given time allotted for the fluxion, then well  $R r$  be the fluxion of the variable line  $A m$ , in the term or point  $R$ . See MOTION and VELOCITY.

The fluxion of a plane surface is conceived in like manner, by supposing a given right line  $mn$  (plate XXXIV. fig. 7.) to move parallel to itself, in the plane of the parallel and immoveable lines  $AF$  and  $BG$ : for if, as above,  $R r$  be taken to express the fluxion of the line  $A m$ , and the rectangle  $R r s S$  be completed; then that rectangle, being the space which would be uniformly described by the generating line  $mn$ , in the time that  $A m$  would be uniformly increased by  $m r$ , is therefore the fluxion of the generated rectangle  $B m$ , in that position. If the length of the generating line  $mn$ , continually varies, the fluxion of the area will still be expounded by a rectangle under that line, and the fluxion of the absciss or base: for let the curvilinear space  $A n m$  (fig. 6.) be generated by the continual and parallel motion of the variable line  $mn$ ; and let  $R r$  be the fluxion of the base or absciss  $A m$ , as before, then the rectangle  $R r s S$ , will be the fluxion of the generated space  $A m n$ . Because, if the length and velocity of the generating line  $mn$ , were to continue invariable from the position  $R S$ , the rectangle  $R r s S$  would then be uniformly generated with the very velocity where-with it begins to be generated, or with which the space  $A m n$  is increased in that position.

**Notation of FLUXIONS.** Invariable quantities, or those which neither increase nor decrease, are represented by the first letters of the alphabet, as  $a, b, c, d$ , &c. and the variable or flowing quantities by the last letters, as  $v, w, x, y, z$ : thus, the diameter of a given circle may be denoted by  $a$ ; and the sine of any arch thereof, considered as variable, by  $x$ . The fluxion of a quantity represented by a single letter, is expressed by the same letter with a dot or full point over it: thus, the fluxion of  $x$  is represented by  $\dot{x}$ , and that of  $y$  by  $\dot{y}$ . And, because these fluxions are themselves often variable quantities, the velocities with which they either increase or decrease, are the fluxions of the former fluxions, which may be called second fluxions, and are denoted by the same letters with two dots over them, as  $\ddot{x}, \ddot{y}$ . In the same manner the fluxions of second fluxions are called third fluxions, and denoted by the same letters with three dots over them, as  $\dddot{x}, \dddot{y}$ ; and so on for fourth, fifth, &c. fluxions, which are expressed by the same letters, with four, five, &c. dots over them, as  $\ddot{\ddot{x}}, \ddot{\ddot{y}}$ ; and  $\ddot{\ddot{\ddot{x}}}, \ddot{\ddot{\ddot{y}}}$ , &c. If the flowing quantity be a fraction, as  $\frac{x x}{d-y}$ , its first, second, third, &c. fluxions are expressed by one, two, three, &c. dots placed in the break of the line that separates the

numerator from the denominator; thus  $\frac{x x}{d-y}$ ,  $\frac{x x}{d-y}$ ,  $\frac{x x}{d-y}$ , &c.

The fluxions of surds are denoted in the same manner, by one, two, or more dots placed in the break of the vinculum of the radical character: thus, if the surd quantity be  $\sqrt{x-y}$ , then will its first, second, third, &c. fluxions be  $\sqrt{x-y}$ ,  $\sqrt{x-y}$ ,  $\sqrt{x-y}$ , &c.

The whole doctrine of fluxions consists in solving the two following problems, viz. 1. From the fluent,

or variable flowing quantity given, to find the fluxion; which constitutes what is called the direct method of fluxions. 2. From the fluxion given, to find the fluent, or flowing quantity; which makes the inverse method of fluxions.

**Direct method of FLUXIONS.** The doctrine of this part of fluxions is comprized in these rules.

1. To find the fluxion of any simple variable quantity, the rule is to place a dot over it: thus the fluxion of  $x$  is  $\dot{x}$ , and of  $y$   $\dot{y}$ . Again the fluxion of the compound quantity  $x+y$ ,  $\dot{x}-\dot{y}$ ; also the fluxion of  $x-y$ , is  $\dot{x}-\dot{y}$ .

2. To find the fluxion of any given power of a variable quantity, multiply the fluxion of the root by the exponent of the power, and the product by that power of the same root, whose exponent is less by unity than the given exponent. This rule is expressed more briefly in algebraical characters, by  $n x^{n-1} \dot{x}$  = the fluxion of  $x^n$ . Thus, the fluxion of  $x^3$  is  $\dot{x} \times 3 \times x^2 = 3 x^2 \dot{x}$ ; and the fluxion of  $x^5$  is  $\dot{x} \times 5 \times x^4 = 5 x^4 \dot{x}$ . In the same manner the fluxion of  $\sqrt{a+y}$  is  $\dot{y} \times \sqrt{a+y}$ ; for the quantity  $a$  being constant,  $\dot{y}$  is the true fluxion of the root  $a+y$ . Again, the fluxion of  $\sqrt{a^2+z^2}$  will be  $\frac{z}{\sqrt{a^2+z^2}} \times 2 z \dot{z}$ ; for here,  $x$  being put  $= a^2+z^2$ , we have  $\dot{x} = 2 z \dot{z}$ ; and therefore  $\frac{z}{\sqrt{a^2+z^2}} \times 2 z \dot{z}$ , for the fluxion of  $x^{\frac{1}{2}}$  (or  $\sqrt{a^2+z^2}$ ) is  $3 z \dot{z} \sqrt{a^2+z^2}$ .

3. To find the fluxion of the product of several variable quantities, multiply the fluxion of each, by the product of the rest of the quantities; and the sum of the products, thus arising, will be the fluxion sought.

Thus, the fluxion of  $xy$  is  $\dot{x}y + \dot{y}x$ ; that of  $xyz$ , is  $\dot{x}yz + \dot{y}xz + \dot{z}xy$ ; and that of  $xyz$  is  $\dot{v}xyz + \dot{x}vyz + \dot{y}vxz + \dot{z}vxy$ . Again, the fluxion of  $\frac{a+x}{b-y}$  is  $\frac{b \dot{x} - a \dot{y} - \dot{x}y - \dot{y}x}{(b-y)^2}$ .

4. To find the fluxion of a fraction, the rule is, from the fluxion of the numerator multiplied by the denominator, subtract the fluxion of the denominator multiplied by the numerator, and divide the remainder by the square of the denominator. Thus the fluxion of  $\frac{x}{y}$ , is  $\frac{y \dot{x} - x \dot{y}}{y^2}$ ; that of  $\frac{x}{x+y}$ , is  $\frac{\dot{x} \times x + y - \dot{x} \times y - x \times \dot{y}}{(x+y)^2}$ ; and that of  $\frac{x+y+z}{x+y}$ , or  $1 + \frac{z}{x+y}$ , is  $\frac{\dot{x} \times x + y - \dot{x} \times y + \dot{z} \times x + y - \dot{x} \times z - \dot{y} \times x}{(x+y)^2}$ ; and so of others.

In the examples hitherto given, each is resolved by its own particular rule; but in those that follow, the use of two or more of the above rules is requisite: thus (by rule 2 and 3.) the fluxion of  $x^2 y^2$  is found to be  $2 x^2 y \dot{y} + 2 y^2 x \dot{x}$ ; that of  $\frac{x^2}{y^2}$ , is found (by rule 2. and 4.) to be  $\frac{2 y^2 x \dot{x} - 2 x^2 y \dot{y}}{y^4}$ ; and that of  $\frac{x^2 y^2}{z}$ , is (by rule 2. 3. and 4.) found to be  $\frac{2 x^2 y \dot{y} + 2 y^2 x \dot{x} \times z - x^2 y^2 \dot{z}}{z^2}$ .

5. When the proposed quantity is affected by a coefficient, or constant multiplier: thus, the fluxion of  $5 x^3$  is  $15 x^2 \dot{x}$ ; for the fluxion of  $x^3$  is  $3 x^2 \dot{x}$ , which, multiplied by 5, gives  $15 x^2 \dot{x}$ . And, in the very same manner, the fluxion of  $a x^n$  will be  $n a x^{n-1} \dot{x}$ .

Having thus explained the manner of determining the first fluxions of variable quantities, it remains to say something of second, third, &c. fluxions. We have already observed, that the second fluxion of a quantity is the fluxion of the first fluxion; and by the third fluxion is meant the fluxion of the second; the fourth, of the third; and so on. The fluxions, therefore, of every order are only the measures of the velocities by which their respective flowing quantities, viz. the fluxions of the immediately preceding order, are generated. Hence it appears, that a second fluxion always shews the rate of the increase or decrease of the first fluxion; and that the third, fourth, &c. fluxions differ in nothing, except their order and notation, from first fluxions; and therefore are also determinable in the



the very same manner, by the rules already laid down: thus (by rule 4.) the (first) fluxion of  $x^3$  is  $3\dot{x}x^2$ ; and if  $\dot{x}$  is supposed constant, that is, if the root  $x$  be generated with an equable or uniform velocity, the fluxion of  $3x^2\dot{x}$  (or  $3\dot{x} \times x^2$ ) again taken (by the same rule) will be  $3\dot{x} \times 2x\dot{x}$ , or  $6x\dot{x}^2$ ; which therefore is the second fluxion of  $x^3$ . Again, the third fluxion of  $x^3$ , or the fluxion of  $6x\dot{x}^2$ , is found to be  $6\dot{x}^3$ ; further than which we cannot go in this case, because the last fluxion,  $6\dot{x}^3$ , is here a constant quantity.

In the preceding example, the root  $x$  is supposed to be generated with an equable velocity: but if the velocity be an increasing or decreasing one, then  $\dot{x}$ , expressing the measure thereof, being variable, will also have its fluxion, which is denoted, as said above, by  $\ddot{x}$ ; and the fluxion of  $\dot{x}$  by  $\ddot{x}$ , and so on, with respect to the higher orders.

Here follow some examples, wherein the root  $x$  (or  $y$ ) is supposed to be generated with a variable velocity. Thus, the fluxion of  $x^3$  being  $3x^2\dot{x}$  (or  $3x^2 \times \dot{x}$ ) the fluxion of  $3x^2 \times \dot{x}$ , considered as a rectangle, will (by rule 3.) be found to be  $6x\dot{x} \times \dot{x} + 3x^2 \times \ddot{x} = 6x\dot{x}^2 + 3x^2\ddot{x}$ ; which is the second fluxion of  $x^3$ . Moreover, from the fluxion last found, we shall in like manner get  $6\dot{x} \times \dot{x}^2 + 6x \times 2\dot{x}\ddot{x} + 6x\dot{x} \times \ddot{x} + 3x^2 \times \ddot{\ddot{x}}$  (or  $6\dot{x}^3 + 12x\dot{x}\ddot{x} + 3x^2\ddot{\ddot{x}}$ ) for the third fluxion of  $x^3$ . Thus also, if  $y = nx^{n-1}\dot{x}$ , then will  $\dot{y} = n \times n-1 \times x^{n-2}\dot{x}^2 + n\dot{x}x^{n-1}$ ; and if  $\dot{x}^2 = \dot{x}j$ , then will  $2\dot{x}\ddot{x} = \dot{x}\dot{j} + j\dot{x}$ : and so of others.

The reader is here desired, once for all, to take particular notice, that the fluxions of all kinds and orders whatever, are contemporaneous, or such as may be generated together, with their respective velocities, in one and the same time.

*Inverse method of FLUXIONS*, or the manner of determining the fluents of given fluxions.

If what is delivered, concerning the direct method, be duly considered, there will be no difficulty in conceiving the reasons of the inverse method: though the difficulties that occur in this last part, upon another account, are indeed vastly great. It is an easy matter, or not impossible at most, to find the fluxion of any flowing quantity whatever; but, in the inverse method, the case is quite otherwise; for, as there is no method for deducing the fluent from the fluxion *a priori*, by a direct investigation; so it is impossible to lay down rules for any other forms of fluxions, than those particular ones that we know, from the direct method, belong to such kinds of flowing quantities: thus, for example, the fluent of  $2x\dot{x}$  is known to be  $x^2$ ; because, by the direct method, the fluxion of  $x^2$  is found to be  $2x\dot{x}$ : but the fluent of  $y\dot{x}$  is unknown, since no expression has been discovered that produces  $y\dot{x}$  for its fluxion. Be that as it will, the following rules are those used by the best mathematicians, for finding the fluents of given fluxions.

1. To find the fluent of any simple fluxion, you need only write the letters without the dots over them: thus, the fluent of  $\dot{x}$  is  $x$ , and that of  $a\dot{x} + b\dot{y}$ , is  $ax + by$ .

2. To assign the fluent of any power of a variable quantity, multiplied by the fluxion of the root; first divide by the fluxion of the root, add unity to the exponent of the power; and divide by the exponent so increased: for dividing the fluxion  $nx^{n-1}\dot{x}$  by  $\dot{x}$ , it becomes  $nx^{n-1}$ ; and adding 1 to the exponent ( $n-1$ ) we have  $nx^n$ ; which, divided by  $n$ , gives  $x^n$ , the true fluent of  $nx^{n-1}\dot{x}$ . Hence, by the same rule, the fluent of  $3x^2\dot{x}$  will be  $=x^3$ ; that of  $2x^3\dot{x} = \frac{x^6}{3}$ ;

that of  $y^{\frac{1}{2}}\dot{y} = \frac{2}{3}y^{\frac{3}{2}}$ ; that of  $ay^{\frac{5}{3}}\dot{y} = \frac{3ay^{\frac{8}{3}}}{8}$ ; and that of

$$y^{\frac{m}{n}}\dot{y} = \frac{y^{\frac{m}{n}+1}}{\frac{m}{n}+1} = \frac{ny^{\frac{m+n}{n}}}{m+n}; \text{ that of } \frac{a\dot{x}}{x^n}, \text{ or } ax^{-n}\dot{x} =$$

$$\frac{ax^{1-n}}{1-n}; \text{ that of } \sqrt[n]{a+x}^3 + \dot{x} = \frac{\sqrt[n]{a+x}^4}{4}; \text{ and that of } \sqrt[n]{a+x}^m \times x^{m-1}\dot{x} = \frac{\sqrt[n]{a+x}^{m+1}}{m \times n + 1}.$$

In assigning the fluents of given fluxions, it ought to be considered, whether the flowing quantity found as above, requires the addition or subtraction of some constant quantity, to render it complete: thus, for instance, the fluent of  $nx^{n-1}\dot{x}$  may be either represented by  $x^n$  or by  $x^n \pm a$ ; for  $a$  being a constant quantity, the fluxion of  $x^n \pm a$ , as well as of  $x^n$ , is  $nx^{n-1}\dot{x}$ .

Hence it appears, that the variable part of a fluent only can be assigned by the common method, the constant part being only assignable from the particular nature of the problem. Now to do this, the best way is to consider how much the variable part of the fluent, first found, differs from the truth, when the quantity which the whole fluent ought to express, is equal to nothing; then that difference, added to, or subtracted from, the said variable part, as occasion requires, will give the fluent truly corrected. To make this plainer by an example or two, let  $y = \sqrt[n]{a+x}^3 \times \dot{x}$ . Here we

first find  $y = \frac{\sqrt[n]{a+x}^4}{4}$ ; but when  $y=0$ , then  $\frac{\sqrt[n]{a+x}^4}{4}$  becomes  $= \frac{a^4}{4}$ ; since  $x$ , by hypothesis, is then  $=0$ ; therefore

$\frac{\sqrt[n]{a+x}^4}{4}$  always exceeds  $y$  by  $\frac{a^4}{4}$ ; and so the fluent, properly corrected, will be  $y = \frac{\sqrt[n]{a+x}^4 - a^4}{4} = ax^3 \times \frac{3a^2x^2}{2}$

$+ ax^3 + \frac{x^4}{4}$ . Again, let  $y = \sqrt[n]{a+x}^m \times x^{m-1}\dot{x}$ : here

we first have  $y = \frac{\sqrt[n]{a+x}^{m+1}}{m \times n + 1}$ ; and making  $y=0$ , the

latter part of the equation becomes  $\frac{\sqrt[n]{a}^{m+1} \times 1}{m \times n + 1} = \frac{a^{m+n}}{m \times n + 1}$ ;

whence the equation or fluent, properly corrected, is  $y = \frac{\sqrt[n]{a+x}^{m+1} - a^{m+n}}{m \times n + 1}$ .

Hitherto  $x$  and  $y$  are both supposed equal to nothing, at the same time; which will not always be the case: thus, for instance, though the sine and tangent of an arch are both equal to nothing, when the arch itself is so; yet the secant is then equal to the radius. It will therefore be proper to add some examples, wherein the value of  $y$  is equal to nothing, when that of  $x$  is equal to any quantity  $a$ . Thus, let the equation  $y = x^2\dot{x}$ , be proposed; whereof the fluent first found is  $y = \frac{x^3}{3}$ ; but when  $y=0$ , then  $\frac{x^3}{3} = \frac{a^3}{3}$ , by the hypothesis; therefore the fluent, corrected, is  $y = \frac{x^3 - a^3}{3}$ . Again,

suppose  $y = x^n\dot{x}$ ; then will  $y = \frac{x^{n+1}}{n+1}$ ; which, corrected,

become  $y = \frac{x^{n+1} - a^{n+1}}{n+1}$ . And lastly, if  $y =$

$\sqrt[n]{c^3 + bx^2}^{\frac{1}{2}} \times x\dot{x}$ ; then, first,  $y = \frac{\sqrt[n]{c^3 + bx^2}^{\frac{3}{2}}}{\frac{3}{2}b}$ : therefore the fluent corrected is  $y = \frac{\sqrt[n]{c^3 + bx^2}^{\frac{3}{2}} - \sqrt[n]{c^3 + ba^2}^{\frac{3}{2}}}{\frac{3}{2}b}$ .

3. To find the fluents of such fluxionary expressions as involve two or more variable quantities, substitute, instead of such fluxion, its respective flowing quantity; and, adding all the terms together, divide the sum by the number of terms, and the quotient will be the

fluent. Thus, the fluent of  $\dot{x}y + j\dot{x}x = \frac{xy + yx}{2} = \frac{2xy}{2} = xy$ ; and the fluent of  $\dot{x}yz + j\dot{x}xz + \dot{x}yx = \frac{xyz + yxz + xzy}{3} = \frac{3xyz}{3} = xyz$ . But it seldom happens that these kind of fluxions, which involve two variable quantities in one term, and yet admit of known and perfect fluents, are to be met with in practice.

Having



Having thus shewn the manner of finding such fluents as can be truly exhibited in algebraick terms, it remains now to say something with regard to those other forms of expressions involving one variable quantity only; which yet are so affected by compound divisors and radical quantities, that their fluents cannot be accurately determined by any method whatsoever. The only method with regard to these, is to find their fluents by approximation, which, by the method of infinite series, may be done to any degree of exactness. See the article *SERIES*.

Thus, if it were proposed to find the fluent of  $\frac{ax}{a-x}$ , it becomes necessary to throw the fluxion into an infinite series, by dividing  $a\dot{x}$  by  $a-x$ : thus  $a\dot{x} \div a-x = \dot{x} + \frac{x\dot{x}}{a} + \frac{x^2\dot{x}}{a^2} + \frac{x^3\dot{x}}{a^3} + \frac{x^4\dot{x}}{a^4}$ , &c. Now the fluent of each term of these series, may be found by the foregoing rules to be  $x + \frac{x^2}{2a} + \frac{x^3}{3a^2} + \frac{x^4}{4a^3} + \frac{x^5}{5a^4}$ , &c. Again, to approximate the fluent of  $\frac{a^2-x^2}{c^2-x^2} \times x^n \dot{x}$ , we first

find the value of  $\frac{a^2-x^2}{c^2-x^2} \times x^n \dot{x}$  expressed in a series to be  $\frac{a}{c} + \frac{a}{2c^3} - \frac{1}{2ac} \times x^2 + \frac{3a}{8c^5} - \frac{1}{4ac^3} - \frac{1}{8a^3c} \times x^4 + \frac{5a}{16c^7} - \frac{3}{16ac^5} - \frac{1}{16a^3c^3} - \frac{1}{16a^5c} \times x^6 +$ , &c. which value being multiplied by  $x^n \dot{x}$ , and the fluent taken by the rules above laid down, we get  $\frac{ax^{n+1}}{n+1 \times c} + \frac{a}{2c^3} - \frac{1}{2ac} \times \frac{x^{n+3}}{n+3} + \frac{3a}{8c^5} - \frac{1}{4ac^3} - \frac{1}{8a^3c} \times \frac{x^{n+5}}{n+5} + \frac{5a}{16c^7} - \frac{3}{16ac^5} - \frac{1}{16a^3c^3} - \frac{1}{16a^5c} \times \frac{x^{n+7}}{n+7} +$ , &c.

In order to shew the usefulness of fluxions, we shall give an example or two. Thus, suppose it were required to divide the given right line AB into two such parts,

$\begin{array}{c} A \qquad \qquad \qquad C \qquad \qquad \qquad B \\ | \text{-----} | \text{-----} | \\ AC, CB, \end{array}$  that their products or rectangles, may be the greatest possible. Let  $AB=a$ , and let the part AC, considered as variable (by the motion of C towards B) be denoted by  $x$ . Then BC being  $=a-x$ , we have  $AC \times BC = ax - xx$ , whose fluxion  $a\dot{x} - 2x\dot{x}$  being put  $=0$ , we get  $a\dot{x} = 2x\dot{x}$ ; and, consequently,  $x = \frac{1}{2}a$ . Hence it appears that AC (or  $x$ ) must be exactly one half of AB.

Again, suppose it were required to find the solid contents of a spheroid, AFBH (*plate XXXIV. fig. 5.*) Let the axis AB, about which the solid is generated, be  $=a$ , the radius  $=p=1$ , and the other axis FH of the generating ellipsis  $=b$ ; then, from the property of the ellipsis, we have  $a^2:b^2::AD \times BD$  ( $x \times a-x$ ):  $DE^2$  ( $y^2$ ). Hence  $y^2 = \frac{b^2}{a^2} \times ax - xx$ ; and the fluxion of the solid  $s$  ( $=py^2 \dot{x}$ )  $= \frac{pb^2}{a^2} \times ax\dot{x} - x^2\dot{x}$ ; and the solidity  $s = \frac{pb^2}{a^2} \times \frac{1}{2}axx - \frac{1}{3}x^3 =$  the segment AIE; which, when AD ( $x$ )  $= AB$  ( $a$ ), becomes  $(\frac{pb^2}{a^2} \times \frac{1}{2}a^3 - \frac{1}{3}a^3) = \frac{1}{6}pab^2 =$  the content of the whole spheroid. Where, if  $b$  (FH) be taken  $= a$  (AB), we shall also get  $\frac{1}{6}pa^3$  for the true content of the sphere, whose diameter is  $a$ . Hence a sphere or spheroid is  $\frac{2}{3}$  of its circumscribing cylinder: for the area of the circle FH being expressed by  $\frac{pb^2}{4}$ , the content of the cylinder whose diameter is FH, and altitude AB, will be  $\frac{pb^2a}{4}$ ; of which  $\frac{1}{6}pab^2$  is evidently two third parts.

FLY, in zoology, a large order of insects, the distinguishing characteristic of which is, their wings; by this they are distinguished from beetles, butterflies, and grasshoppers.

FLY, in mechanicks, a cross with leaden weights at its end, or rather a heavy wheel at right angles to the axis of a windlass, jack, or the like: by means of which the force of the power, whatever it be, is not only preserved, but equally distributed in all parts of the revolution of the machine.

FLY BOAT, or FLIGHT, in the Dutch marine, certain merchant ships of a very clumsy make, nearly similar to the genius of the builders: they are generally from 4 to 600 tons, and distinguished by a very high stern, like a Gothick turret above, and very broad buttocks below. See *BUTTOCK*.

FLYERS, in architecture, such stairs as go straight, and do not wind round; nor have the steps made tapering, but the fore and back part of each stair, and the ends, respectively parallel to one another; so that if one flight do not carry you to your intended height, there is a broad half space, from whence you begin to fly again, with steps every where of the same length and breadth as before.

FLYING, the progressive motion of a bird, or other winged animal, in the liquid air.

The parts of birds, &c. chiefly concerned in flying, are the wings and tail; by the first the bird sustains and wafts himself along; and by the second he is assisted in ascending and descending, to keep his body poised and upright, and obviate the vellications thereof. It is by the largeness and strength of the pectoral muscles that birds are so well disposed for quick, strong, and continual flying. These muscles, which in men are scarce a seventieth part of the muscles of the body, in birds exceed and outweigh all the other muscles taken together. Hence Mr. Willoughby observes, that if it were possible for man to fly, his wings must be so contrived and adapted, that he may use his legs, and not his arms, in managing them.

Artificial FLYING, that attempted by men, by the assistance of mechanicks.

The art of flying has been attempted by several persons in all ages. The Leucadians, out of superstition, are reported to have had a custom of precipitating a man from a high cliff into the sea, first fixing feathers, variously expanded, round his body, in order to break his fall. Friar Bacon, who lived 500 years ago, not only affirms the art of flying possible, but assures us, that he himself knew how to make an engine wherein a man fitting might be able to convey himself through the air, like a bird; and further adds, that there was then one who had tried it with success; but this method, which consisted of a couple of large, thin, hollow copper globes, exhausted of the air, and sustaining a person who sat thereon, Dr. Hook shews to be impracticable. The philosophers of king Charles the Second's reign, were mightily busied about this art. The famous bishop Wilkins was so confident of success in it, that he says, he does not question but, in future ages, it will be as usual to hear a man call for his wings, when he is going a journey, as it is now to call for his boots.

FLYING Bridges, in fortification, are those made of two small bridges, laid one upon another, so that the uppermost, by means of ropes and pulleys, is forced forwards till the end of it reaches the opposite shore.

FLYING Camp, a small body of an army, consisting of 4, 5, or 6000 men, as well horse as foot, which continually keep the field, making divers motions, to prevent the incursions of the enemy, or frustrate his enterprizes; to hinder convoys, to harass the adjacent country, or to be thrown into a besieged place, as occasion shall require.

FLYING Pinion, is a part of a clock having a fly or fan, whereby to gather air, and by that means check the rapidity of the clock's motion, when the weight descends in the striking part. See *CLOCK*.

FOAL, or COLT, the young of the horse kind. See the article *HORSE*.

FOCUS, in geometry and conick sections, is applied to



to certain points in the parabola, ellipsis, and hyperbola, wherein the rays reflected from all parts of these curves meet and concur; see each under its proper article.

**FODDER**, any kind of meat for horses, or other cattle. In some places, hay and straw, mingled together, is peculiarly denominated fodder.

**FODDER**, in the civil law, is used for a prerogative that the prince has, to be provided of corn and other meats for his horses, by the subjects, in his warlike expeditions.

**FODDER**, in mining, a measure containing  $22\frac{1}{2}$  hundred weight, though in London but 20 hundred weight.

**FODINA**, in anatomy, the labyrinth of the ear. See **E.A.R.**

**FOENUGREEK**. See the article **FENUGREEK**.

**FOETER**, in medicine, stinking or foetid effluvia, arising from the body, or any part thereof.

**FOETUS**, in physiology, denotes the child while it is contained in the mother's womb, but particularly after it is formed, till which time it is more properly called embryo.

**FOG**, or **MIST**, a meteor, consisting of gross vapours, floating near the surface of the earth.

**FOGAGE**, in the forest law, is rank grass not eat up in summer.

**FOIL**, among glass-grinders, a sheet of tin, with quicksilver or the like, laid on the backside of a looking-glass, to make it reflect.

**FOIL**, among jewellers, a thin leaf of metal placed under a precious stone, in order to make it look transparent, and give it an agreeable different colour, either deep or pale: thus, if you want a stone to be made of a pale colour, put a foil of that colour under it; or if you would have it deep, lay a dark one under it.

**FOLDAGE**, the liberty of penning sheep by night.

**FOLDING of Sheep**. In some places they set their fold with several partitions, and put the widders, ewes, and lambs, separate by themselves. It is not good to fold them in rainy weather: and, as it is the opinion of some husbandmen that urine of sheep, heats, helps and comforts the land as much or rather more than their dung does, they cause all the sheep in the fold to be raised before they let them go out, and go about the sides of the fold with a dog; for commonly when sheep see a dog come nigh them, they will dung and stale.

**FOLIA**, among botanists, particularly signify the leaves of plants; those of flowers being expressed by the word *petal*.

**FOLIACEUM EXPANSUM**, in anatomy, a term applied to the extreme part of the fallopian tube, next the ovary, which is expanded like the mouth of a trumpet, and surrounded with a sort of fringe.

**FOLIAGE**, among botanists, particularly signifies the leaves of plants; though by some it is applied to the petals of a flower. See **LEAF** and **COROLLA**.

**FOLIATING of Looking-Glasses**, is performed by fixing quicksilver on the reverse surface, by means of plates of tin; which amalgamating or combining with the quicksilver, takes away its fluidity, and renders it so tenacious, as to be compressed into a very thin coat or plate, capable of adhering to the surface of the glass.

There are several manners of laying the quicksilver and tin on the glass; and it is by some practised, to use the quicksilver alone; and by others, to compound with it tin and lead; and bismuth has likewise been frequently used instead of them: but it is not necessary, when the operation is well conducted, to make any addition to the quicksilver. The following is one of the best methods hitherto practised:

A proper number of sheets of thin paper must be procured; which paper should be of a soft spongy nature, like that called blotting paper. This paper must be spread on a table with a very level even surface, and fixed very firmly; or it is better to use a marble slab; but so much only of the slab should be covered as may form an area of the same figure with that of the glass to be silvered, a little enlarged. Over the surface of the paper must be sprinkled some powdered chalk; which should be covered with tin beaten very thin, and that laid upon

the paper sprinkled with chalk, in the most smooth and even manner: and where there is occasion, on account of the size of the glass, to use more than one, they should be joined with great exactness, rather suffering the edge of one to bear on the other, than leaving any deficiency; so that the whole surface of the paper may be perfectly covered. Quicksilver is then to be poured upon these leaves of tin, and spread over every part of it by a hare's foot, or the feathered part of a quill. The sheets of very thin smooth paper, of which the kind called fan paper is best, must be then laid over the quicksilver, leaving a margin beyond the quicksilver; and upon this paper the glass must be gently laid: and then, being pressed down with the one hand, the paper must be gently drawn from under it with the other, by taking hold of the margin left for that purpose. The upper surface of the glass must then be covered with thicker paper, and a considerable weight put over it, in order to press out all the quicksilver that is not fixed by the tin; as well as to make it adhere the more firmly to the glass. When no more quicksilver appears to drain off, the weights and paper may be removed, and the operation will be complete.

Globes of glass may be silvered; but as no pressure can be given, the plates of tin cannot be used; and the quicksilver must therefore be rendered of a proper consistence, by amalgamating it with some of the other metallick substances. The most approved method of doing this is as follows:

Take of quicksilver two parts, of bismuth two parts, and of tin and lead each one part. Melt the tin and lead together, and when they are fluid, add the bismuth; when that is melted likewise, take them from the fire; and put the quicksilver gradually to them, stirring the mixture till the whole be united. After the mass is become so cool, as not to endanger its breaking the glass, pour it into the globe to be silvered; using a funnel, which will carry it to the bottom of the globe. Move the glass then gently about, so that the amalgamated matter may flow over every part, and adhere to it; which will effectually silver the globe. When every part is covered, pour out the redundant quantity, and keep the glass still, till it be perfectly cool. If, during the operation, the mixture is set in the globe, and be not sufficiently liquid to flow about, and cohere with the glass, a gentle heat must be administered, which will remedy this defect; and if, on the contrary, the matter appear too fluid, and have not sufficient tenacity to fix itself to the glass, it must be taken out, and an additional quantity of the bismuth, tin and lead, added, by means of a proper heat.

**FOLIATION**, a term used by some botanists to note the corolla, or flower leaves.

**FOLIO**, in merchant books, denotes a page, or rather both right and left hand pages, these being expressed by the same figure, and corresponding to each other. See **BOOK-KEEPING**.

**FOLIO**, among printers and booksellers, the largest form of books, when each sheet is printed, that it may be bound up in two leaves only.

**FOLLICLE** *Folliculus*, among botanists, denotes a kind of seed-vessel, like the conceptaculum.

**FOMAHANT**, or **FOMALHANT**, in astronomy, a star of the first magnitude in Aquarius, whose latitude is  $29^{\circ} 19' 11''$  south, and longitude  $27^{\circ} 23' 24''$  of Capricornus, according to Mr. Flamsteed's catalogue.

**FOMENTATION**, in medicine, the bathing any part of the body with a convenient liquor; which is usually a decoction of herbs, water, wine, or milk; and the applying of bags stuffed with herbs and other ingredients, which is commonly called dry fomentation.

**FONTANELLA**, in anatomy, the quadrangular aperture, between the os frontis and the ossa fincipitis, in infants just born, which is also called fons parietalis.

**FONTICULUS**, or **FONTANELLA**, in surgery, an issue, seton, or small ulcer made in various parts of the body, in order to eliminate the latent corruption out of it. See **ISSUE**, **SETON**, &c.

**FONTINALIA**, in Roman antiquity, a religious feast celebrated on October 13, in honour of the nymphs of wells and fountains.



**FONTINATIS**, in botany, a genus of mosses. The male flower is almost sessile. The antheræ are oblong, with an open mouth, and covered with smooth conick calyptræ.

**FOOD** implies whatever aliments are taken into the body, to nourish it.

**FOOT**, *Pes*, a part of the body of most animals, whereon they stand, walk, &c.

**Foot**, in Latin and Greek poetry, a metre or measure, composed of a certain number of long and short syllables:

**Foot**, a longitudinal measure; in England it is commonly divided into 12 inches, but by geometricians 10 digits, and every digit into 10 lines; this latter kind of division is mostly observed in foreign nations: but the foot itself differs in length in different countries; thus the English foot is to that of Paris as 1000 to 1068; to that of Dantzick as 1000 to 944; to the ancient Greek as 1000 to 1007; to the old Romans as 1000 to 970; and to that of Venice as 1000 to 1162.

**Foot-BANK**, or **Foot-STEP**, in fortification, is an elevation of earth, forming a path which runs along the inside of a parapet, upon which the musketeers get up in order to discover the counterscarp, or to fire on the enemy in the moat, or in the covert-way.

**Foot-Husks**, among botanists, short heads, out of which flowers grow.

**Foot-LEVEL**, among artificers, an instrument that serves as a foot-rule, a square, and a level. See **LEVEL**, **RULE**, and **SQUARE**.

**Foot-PACE**, or **HALF-PACE**, among carpenters, a pair of stairs, whereon, after four or six steps, you arrive at a broad place, where you may take two or three paces before you ascend another step. The design of which is to ease the legs in ascending the rest of the steps.

**Foot-Ropes**, among sailors, the same with the horses of the yards. See **HORSE**.

**FORAMEN**, in anatomy, a name given to several apertures, or perforations in divers parts of the body; as, 1. The external or internal foramina of the cranium or skull. 2. The foramina in the upper and lower jaw. 3. Foramen lachrymale. 4. Foramen membranæ tympani.

**FORAMEN OVALE**, an oval aperture or passage through the heart of a fœtus, which closes up after the birth.

**FORCE**, in law, denotes an offence by which violence has been towards any person or thing; and it is either simple or mixed.

*Simple FORCE*, is that which is so committed, as to have no other crime annexed to it; as if a man enter forcibly into another's possession without doing any other unlawful act.

*Mixed or Compound FORCE*, is that violence which is committed together with such a fact, as of itself alone is criminal: as if any man forcibly enter into another man's possession, and kill a man or ravish a woman there, &c.

*Attractive FORCE*. See the article **ATTRACTION**.

*Central FORCE*. See **CENTRAL FORCE**.

*Centrifugal FORCE*. See **CENTRIFUGAL FORCE**.

*Centripetal FORCE*. See **CENTRIPETAL FORCE**.

*FORCE of the Wind*. See **ANEMOMETER**.

**FORCEPS**, in surgery, an instrument that is well known, of which there are several sorts, adapted to various operations. Their uses are to lay hold of any thing and extract it from the body.

**FORCIBLE Entry**, is an actual violent entry into a house, land, &c. or taking distress of any body with offensive weapons, either by offering violence to any person there, or furiously driving any out of the possession thereof.

**FORCING**, among gardeners, the raising of cucumbers, melons, strawberries, &c. on common hot-beds; also the producing ripe fruit from several sorts of trees before their usual season. Peaches, nectarines, cherries and grapes, being the most valuable and admired wall-fruits, the common method of forcing them is as follows: the trees designed to be forced should be in good condition, with a good quantity of blowing

wood; these should be covered with moveable glasses sloping from the top of the wall to about four feet and a half from the bottom, and closed at each end; these may be put on in February, as early forcing is liable to miscarriage: on the north side of the wall there should be a quantity of new horse-dung, placed sloping as the glasses on the other side, but wider; this will throw a considerable heat through the wall (which should not be too thick) and thereby cause (with the aid of the sun in front) the blossoms and leaves to come quickly: when the heat of the dung is much abated, it may be necessary to remove it, and lay a fresh quantity in its stead. When the trees are in full flower, they should have a considerable share of air at all favourable opportunities, otherwise the blossoms will fall off, and consequently the crop miscarry; also it will be necessary to give the roots refreshings of water, as likewise the branches; but this must be done in the morning, when there is an appearance of a sunny day.

But we think the following method of forcing preferable to the former; this is practised in Holland, and lately introduced in a few gardens in England, particularly at the Earl of Ancrum's, at Charlton in Kent, where they force peaches and nectarines in very great perfection, without detriment to the trees. To give the reader a proper idea of the forcing frame, we have exhibited in (*plate XXXV. fig. 1.*) a sketch in perspective (the front end is the section) of one which contains two trees, and may be continued to any length at pleasure: the line *a* is the surface of the ground; *b* is the pit filled with new tan, which heats the frame; *c* is the space left to go in to manage the under part of the tree, and to gather the under fruit, which are almost as numerous as those on the upper side; *d* is a lattice-work to train the trees on, at about ten inches below the glasses *f*. The roots of the trees are partly within the frame and partly without, extending within as far as the tan-bed *b*, the bottom of the stem being just within the lower part of the frame at *g*. The lights or glasses may be about four feet and a half or five feet wide, and six feet and a half long; each of which will contain a middling sized tree. It may be asked how a tree can properly be planted to form the direction here described (which may make an angle of about forty degrees with the horizon); in answer to which, it is to be supposed that the tree has previously been trained against a wall, and consequently the major part of the roots have a direction but one way; therefore in planting the tree to force in this sort of a frame, it is only reversing it, that is, the side which was next the wall will be uppermost in the frame, and the roots downward, which will be of no detriment to it. The management, &c. is much the same as the former method of forcing; but, for the benefit of those who have an inclination to early raised fruits, we would by all means recommend this last form; and at the same time we cannot but disapprove of those forcing frames which have a flue in the wall, as it is so very drying, that few trees escape being pestered with a multitude of insects, which prey on them so much as finally to be their utter destruction, unless an almost continual washing the leaves and branches prevents it.

*FORCING of Wine*. See the article **WINE**.

**FORE-CASTLE**, in ship-building, a short deck which reaches from the top of the stem to the after-part of the fore-throuds; or it commonly reaches as far abaft as it is from the foremast to the upper part of the stern.

**FORECLOSED**, in law, denotes a summons sent by the court to one party to give in answer to the other in a limited time, in default of which it is certified he shall not be heard any more, and the process shall be determined.

**FOREIGN**, in general, is applied to a person born in some other prince's dominions, or any thing brought from thence, and is opposed to native. In physick it is applied to any preternatural substance, either from without, or generated internally in the human body.

**FOREIGN Apposer** or **Opposer**, an officer in the Exchequer, to whom all sheriffs and bailiffs repair to be apposed by him of their green wax, after they have been apposed of their sums out of the pipe-office; and from thence



thence he draws down a charge upon one of them to the clerk of the pipe. His business is also to examine the sheriff's estreats with the record, and to ask the sheriff what he says to every particular sum therein.

**FOREIGN Plea**, a refusal of the judge as incompetent, because the matter in hand was not within his precinct.

**FOREIGN Service**, is such service, whereby a man holdeth of another, without the compass of his own fee; or that which a tenant performeth either to his own lord, or to the lord paramount of his own fee.

**FOREJUDGED the Court**, is when an officer of any court is expelled the same for some offence, or for not appearing to an action by bill filed against him. In the latter case he is not to be admitted till he shall appear, but shall lose his office, and be fore-judged the court.

**FORE-JUDGER**, in law, a judgment whereby a man is deprived of any thing in question.

**FORELAND**, in navigation, a head-land, or that which juts out into the sea.

**FORELAND**, in fortification. See **BERME**.

**FORELOCKS**, or **FORE-LOCK-KEYS**, in a ship, are little flat wedges, or pieces of iron, used at the ends of bolts, to keep them from flying out of the holes. They are also used to keep fast down the cap-squares of the carriages of the guns.

**FORELORN HOPE**, or *Enfans perdus*, in military affairs, are the men detached from the horse or foot of an army that fight in the front, or enter first the breach for an assault.

**FOREMAST of a Ship**, that which stands near the head, and which carries the fore-sail, fore-top-sail, &c. See the article **SHIP**.

**FOREST**, is, in general, a certain territory, or tract of ground for the most part covered with wood, that is not inclosed, for wild game to range therein, and so is opposed to park, which is inclosed. Forests are of that antiquity in England, that, excepting the new forest in Hampshire erected by William the Conqueror, and Hampton-court by Henry VIII. there is no certain mention on record of their beginning. New forest was erected by the destruction of 22 parishes for 30 miles together.

**FOREST**, in a law sense, more particularly denotes a large wood that is privileged to hold the king's game of all kinds. The properties of a forest are, 1. That it can be in no hands but those of the king; for none have a power to grant a commission to be a justice in eyre of the forest, but the king. The second property consists in the courts of the forest, as the justice-seat every three years, the swain-mote thrice every year, and the attachment once every forty days. The third property are the officers belonging to it, for the preservation of the vert and venison, as the justices of the forest, the warden, or keeper, verdurers, foresters, agistors, regarders, bailiffs, beadles, and the like. There are 69 forests in England, 13 chaces, and 800 parks. The four principal forests are New Forest, Sherwood, Dean, and Windsor forests.

**FOREST Laws**, the particular laws relating to the king's forests, &c. a good many of which our statutes contain.

**FORESTAFF**. See the article **CROSS-STAFF**.

**FORESTALLING**, the stopping any person or thing by the road; as forestalling the market is buying up any provisions, as they are on the road bringing to market.

**FORESTER**, a sworn officer of the forest, appointed by the king's letters patent to walk the forest, and watch the vert and venison. Also to present to the forest-court all trespasses against either within his walk, or bailiwick.

**FORE-TOP-MAST**, See **TOP-MAST**.

**FORFEITURE**, implies, originally, a transgression or offence against some penal law. But, with us, it is more commonly used to signify the effect of such transgression, or the being deprived of some right, privilege, estate, honour, office, or effects, in consequence thereof, than for the transgression itself.

**FORGE**, a small furnace, wherein smiths, and

other artificers, heat their metals, in order to soften and render them more malleable.

**FORGE**, is also used to signify a large furnace wherein iron is melted down. See **IRON**.

**FORGERY**, is the inventing or contriving any thing fraudulently.

**FORGERY**, in law, the fraudulent making of false writings, &c. and publishing them, knowing them to be so, to the prejudice of any man's right; or it is the writ that lieth against the forger, or person that commits this offence, by some called the writ of deceit.

**FORGING**, is either the act of working at a forge, or fraudulently inventing any thing to deceive.

**FORM**, *Forma*, in philosophy, is the essential or distinguishing modification of the matter whereof a natural body is composed, so as thereby to give it such a peculiar manner of existence: and all this is no more than an assemblage or aggregate of as many particular qualities as serve to denominate the body of such a nature, and to give it such a name.

**FORM**, also denotes the external figure of a body, as to its quantity of matter, and the three dimensions of length, breadth, and depth.

**FORM**, in printing, a certain number of pages contained within an iron or steel quadrangle, which being made tight by wooden quoins, &c. is laid upon the press to be printed off. See **PRINTING**.

**FORMA PAUPERIS**, or *in Forma Pauperis*, is when any person has cause of suit, but is so poor that he cannot pay the usual charges of suing at law or equity.

**FORMALITY**, any certain form or rule in judicial proceedings; likewise certain ceremonies that are observed in civil life, negotiations, &c.

**FORMATION**, the act by which any thing is formed or produced.

**FORMATION**, in grammar, denotes the manner in which one word is formed or derived from another.

**FORMEDON**, in law, a writ that lies for him that hath a right to any lands or tenements, by virtue of an entail; and it lies three ways; as,

**FORMEDON in the Descender**, which lies for the recovery of lands, &c. given to one and the heirs of his body, or to a man and his wife, and the heirs of their bodies, or to a man and his wife, being cousin to the donor in frank marriage, and afterwards alienated by the donee; for, after his decease, his heirs shall have this writ against the tenant or alienee.

**FORMEDON in the Reverter**, lieth for the donor or his heirs, where land is entailed to certain persons and their issue, with a condition, for want of such issue, to revert to the donor and his heirs.

**FORMATION**, in philosophy, an act whereby something is formed or produced.

**FORMATION**, in grammar, signifies the manner of forming one word from another: thus accountantship is formed from accountant, and this last from account.

**FORMERS**, in gunnery, round pieces of wood, fitted to the diameter of the bore of a gun, chiefly used for making cartridges. On these formers, the paper, parchment, or cotton, which is to make the cartridge, are rolled before it be sewed.

**FORMICA**, in zoology. See **ANT**.

**FORMICA-LEO**, the ant-lion, or ant-eater, in zoology, an insect so called from its devouring great numbers of ants. It is the caterpillar or worm of a fly, much resembling the libellæ, or dragon-flies.

**FORMING the Line**, in naval affairs, drawing up the ships of a squadron or division in a straight line, about 120 fathoms distance from each other. See the article **LINE of Battle**.

**FORMULA**, or **FORMULARY**, a rule or model, or certain terms prescribed or agreed by authority, for the form and manner of an act, instrument, proceeding, or the like.

**FORMULA**, in medicine, imports the constitution of medicines, either simple or compound, both with respect to their prescription and consistence. Paracelsus calls red and clear urine, formula urinæ.

**FORNICATION**, the act of incontinency between single persons; for when either of the parties is married, such act is adultery. See **ADULTERY**.

**FORNIX**,



**FORNIX**, in anatomy, a part of the brain placed under the septum lucidum, and like it, composed of a medullary substance. Its anterior part rises with a double base, but the two parts soon unite: the hinder part is likewise bifid, and thence called *crura fornicis*, and by some, *pedes hippocampi*. See **BRAIN**.

**FORRAGE**, in the military art, denotes hay, oats, barley, wheat, grass, clover, &c. brought into the camp by the troopers, for the sustenance of their horses.

Dry forage is the hay, oats, &c. delivered out of the magazines, to an army in garrison, or when they take the field, before the green forage is sufficiently grown up to supply the troops.

**FORT**, in the military art, a small fortified place, environed on all sides with a moat, rampart and parapet. Its use is to secure some high ground, or the passage of a river, to make good an advantageous post, to defend the lines and quarters of a siege, &c.

**FORTS** are made of different figures and extents, according as the ground requires. Some are fortified with bastions, others with demi-bastions. Some again are in form of a square, others of a pentagon. A fort differs from a citadel, as this last is built to command some town. See **CITADEL**.

*Royal FORT*, one whose line of defence is at least 26 fathoms long.

**FORTIFICATION**, the art or science by which we are taught to put a place in such a state of defence, as from each of its parts the enemy may lie open in front and flank, and their approaches be hindered by the breadth and depth of the fosse, the height and solidity of the rampart, by parapets, bulwarks, &c. So that behind these works a small body of troops may defend themselves to advantage against a considerable army, and an enemy in attacking them must needs suffer great loss.

Fortification is usually divided into natural, artificial, ancient, modern, regular, irregular, offensive, and defensive. Some have made several orders of fortification, in imitation of architecture; the one they call the French order, the other the Dutch, the third the Italian, &c.

History does not acquaint us with the name of the first inventor of fortification. We may presume that in the first ages of the world prudence and necessity induced men to the practice of this art. That at first they defended themselves and their flocks within inclosures made of the trunks and branches of trees mixed with earth. Then, when insolence and injustice came to some height, the more peaceable associated together, forsook their habitations in the open fields, and built places of safety called towns, which they surrounded with walls, to prevent surprise. And not only so, but, to prevent hostile attempts, they erected little walls or parapets within the larger walls, behind which they defended themselves with their arrows, at the same time covering themselves from those of the enemy and opposing their approaches. After this, the better to facilitate the execution with their arrows, they made use of port-holes at proper distances in these parapets. The besiegers, to defend themselves from these holes, were covered with shields and bucklers, whereby they might approach in safety the foot of the walls, and then scale them: and in order to destroy these walls, they invented battering rams, and wooden machines armed with iron; which being suspended, and driven by the force of men, beat down the walls, made a breach, and through this the assault was facilitated. To obviate the effect of these engines, the besieged made the foot of their walls with a talus or slope: but as the besiegers might, for all this, with pick-axes, hammers, &c. break down the walls, the besieged made their parapets jut out in a salient angle, under which they had a portcullis, to throw stones and fire upon the head of the besiegers, that prevented a sap or breach in the walls. The besiegers, to favour their approaches and post themselves at the foot of the wall, invented, as a principal engine, wooden galleries that were moveable upon wheels, and covered at top, under which they worked their battering-rams, or covered such as were employed about the demolition of the wall. To obviate this, the besieged surrounded

the place with a ditch, the depth of which prevented the approaches of the enemy's engines. The besiegers endeavoured to fill up the ditch, notwithstanding all opposition from the holes and portcullis, for which purpose they invented several machines to throw stones into the defences of the place. As till then the walls and ramparts were surrounded with circular, or rather several right lines, that only formed salient angles, and were but a bad defence for the ditch: therefore they made these lines into salient and returning angles quite round: but still there was a space at the foot of the returning angle, which the besieged could not defend on account of its height; and, therefore, they invented towers at each salient angle that defended the returning angle. But, as arrows are shot off in a right line, and as the convexity of round towers could not be seen nor flanked lengthwise, they invented square towers that were only salient angles, an arrow-shot distant from each other, and these they erected quite round the place. Afterwards the foot of these towers was surrounded with a little foot-track covered with a wall, to hinder a descent into the ditch, and this has since been called *fausse braye*. The besiegers, perceiving that these towers opposed their approaches, likewise raised towers that were higher upon the outer edge of the ditch which they called *counterscarps*. From these posts they discovered the besieged in their towers, and drove them from thence with stones, arrows, javelins, and other engines, till they sent a detachment to scale the walls and make themselves masters of them.

The old Greeks and Romans, who borrowed both their offensive and defensive arms from the people of the East, fortified their cities almost in the same manner with fosses, curtains, and towers. And we find that the best towns of the ancients were situated upon eminences. Cæsar, in book vii. of his war with the Gauls, describes the walls of the city of Bourges or Bruges, from which we may form some idea of the ancient method of fortification. Vitruvius has treated of the fortification of the ancients in ch. 3. b. i. and b. x.

The above manner of attacking and defending places continued till about 1378, when Bertold Schwart, a Cordelier friar, found out the secret of gun-powder, though some are of opinion that the invention is owing to the Chinese. Immediately men applied themselves to discover the different uses in which powder might be employed. The musket was first invented, and afterwards the cannon. Then the method of fortification was altered, but at first giving the ramparts and towers more thickness and more strength. And the besieged, observing that round towers and even square ones had always some place that was not seen from the body of the fortress, and that the miners of the besiegers might carry on their works without any danger from the fire of the place, changed the form of their towers, by making them terminate in a point towards the country, which exposed the besiegers: they also diminished the height of these towers, increased their solidity, and left open the ground they surrounded. In this state they were called bastions, where they placed part of the garrison as a guard, and planted their batteries.

There can be no comparison stated between the ancient and modern method of fortification, because their manner of attacking and defending is entirely different.

The moderns have retained all they could after the ancients; the fire-arms have obliged them to use other precautions; but have invented nothing that would have been of use to the ancients. We have borrowed from them the breadth and depth of the ditches, the thickness of the walls, the towers to flank the curtains, the pallisadoes, the intrenchments within the ramparts and towers, the advantage of many flanks, in multiplying of which only modern fortification consists; and this fire-arms make the more easy to execute.

Fortification, according to the modern methods, is either regular or irregular.

Regular fortification, is that built in a regular polygon; the sides and angles of which are all equal, being commonly about a musket-shot from each other.

Irregular fortification, on the contrary, is that where the sides and angles are not uniform, equidistant, or equal;







Fig. 1. Fountain



Fig. 2. Fountain



Fig. 3. Fountain

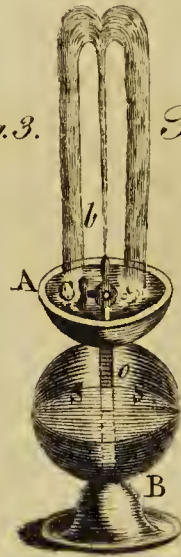


Fig. 4. Fountain

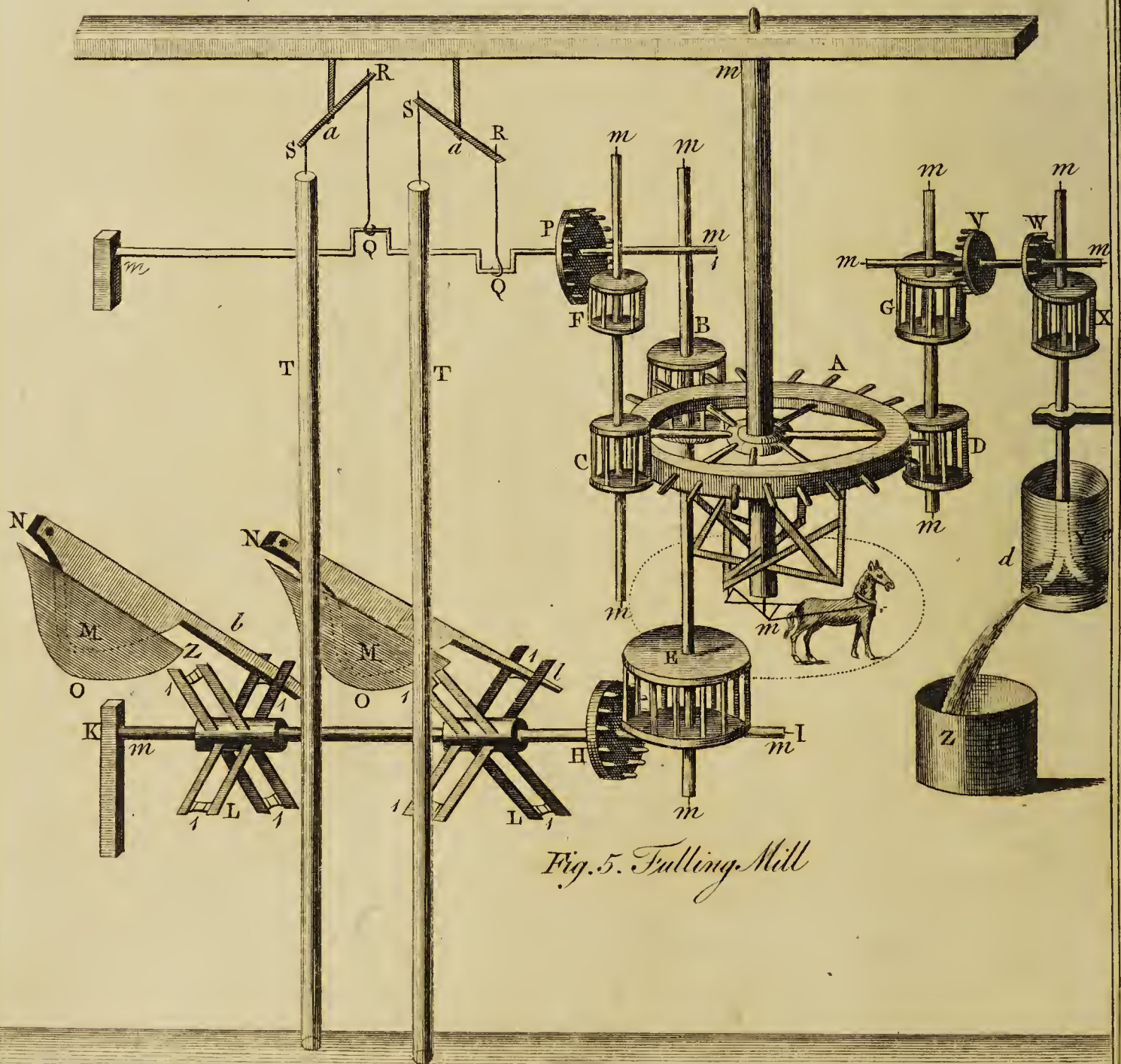
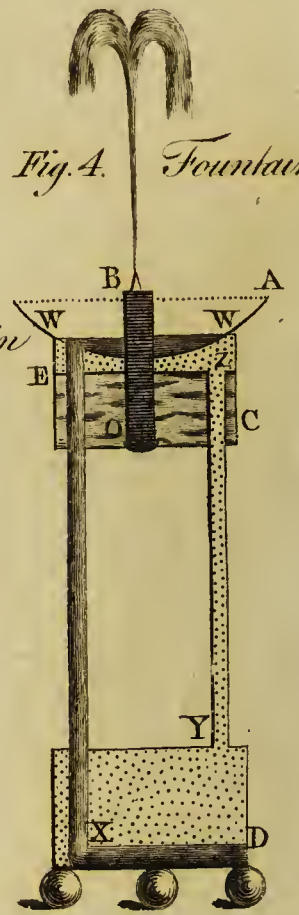


Fig. 5. Fulling Mill



equal; which is owing to the irregularity of the ground, valleys, rivers, hills, and the like.

The principal maxims of fortification are these: 1. That every part of the works be seen and defended by other parts, so that the enemy can lodge nowhere without being exposed to the fire of the place. 2. A fortress should command all places round it; and therefore all the out-works ought to be lower than the body of the place. 3. The works furthest from the centre ought always to be open to those more near. 4. No line of defence should exceed a point-blank musket-shot, which is about 120 or 125 fathoms. 5. The more acute the angle at the centre is, the stronger will be the place. 6. In great places, dry trenches are preferable to those filled with water, because sallies, retreats, and succours, are frequently necessary; but, in small fortresses, water-trenches that cannot be drained, are best, as standing in need of no sallies, &c.

**Marine FORTIFICATIONS.** Though these have nothing peculiar in them, yet it may not be improper to give some directions with relation to batteries. 1. In raising batteries to hinder a descent, care should be taken to dispose them in such places where the descent is most easy; and the guns should be so levelled as to scour the surface of the water, that they may fire effectually upon the boats as they approach. 2. It is likewise convenient to have batteries to play upon the places where there is good anchorage; and these should be somewhat more elevated than the former. 3. It is also necessary to erect batteries at the entrance of roads; and these ought to be so made, as to discover ships at a distance. 4. It is very necessary that these batteries should be defended by some works, against attacks; and if possible, should be under the fire of the place; or, at least they ought not to be too far advanced.

**FORTIN, FORTLET, or Field-FORT,** a sence or little fort, whose flanked angles are generally distant one from another 120 fathoms.

**FORTISSIMO,** in music, signifies to sing or play very loud or strong.

**FORTUNE, fortuna,** a goddess worshipped with great devotion by the ancient Greeks and Romans, who believed her to preside over human affairs, and to distribute wealth and honour at her pleasure.

**FORUM,** in Roman antiquity, a public standing place within the city of Rome, where causes were judicially tried, and orations delivered to the people.

**FOSS, or Fossa,** in anatomy, a kind of cavity in a bone, with a large aperture, but no exit, or perforation.

Foss is particularly used for the cavity, or indenture, in the back part of the neck.

**Fossa MAGNA,** the interior cavity, or rima magna, or the pudendum muliebræ. Bartholin calls it fossa navicularis.

**Foss,** in fortification, a hollow place, commonly full of water, lying between the scarp and counterscarp, below the rampart; and turning round a fortified place or a post that is to be defended. See **MOAT**.

**Fossa,** in our ancient customs, was a ditch full of water where women guilty of felony were drowned and even hanged: Fossa likewise denoted a grave.

**Foss-Way,** one of the great highways in England made by the Romans with a ditch on each side.

**FOSSIL,** in natural history, any body that is dug out of the earth; as metals, minerals, &c.

**Native FOSSILS,** which are properly called fossils, are substances generated in the earth, the constituent parts of which are so simple and homogenous that there is no apparent distinction of vessels and juices between the parts and the whole; and they are either simple or compound.

**Simple FOSSILS,** are such, whose parts, however they may be divided, are all of the same nature; that is the same gravity, magnitude, figure, &c. as quicksilver.

**Compound FOSSILS,** are such as are capable of being divided into different or dissimilar parts, as antimony and sulphur.

**Adventitious and Foreign FOSSILS,** are such as have, according to some, been deposited in the earth by the universal deluge, or some other means; as the exuviae of the sea and land animals, fossil shells, bones, teeth,

&c. which are found in great abundance in the earth.

**FOTUS,** in medicine. See **FOMENTATION**.

**FOVEA Cordis,** in anatomy, is the pit of the heart, or rather stomach.

**FOUGADE, or Fougass,** in the art of war, a little mine in form of a well, between 8 and 10 feet wide, and between 10 and 12 feet deep, which is made to blow up any thing: it is filled with sacks or barrels of powder that are covered with earth.

**FOUL,** in the sea-language, is used in two senses: when a ship has been long untrimmed, so that grass, weeds, &c. stick to her sides under water, she is said to be foul. They also say a rope is foul, when it is entangled, so that it cannot run or be haled. When one ship runs against another, they are said to run foul.

**FOUNDATION,** the base or bottom underground, upon which any building is laid.

There are several things to be well considered in laying the foundations of a building. We are first to examine the bed of earth upon which we are to build, and then the under-fillings or substruction as Vitruvius calls it.

Palladio allows a sixth part of the height of the whole building for the hollowing or under-digging, unless there be cellars under ground; in which case he would have it somewhat lower. As to thickness double the width of a wall is a good rule. The best way to discover the nature of the soil, is to try it with an iron crow or borer, such as well-diggers use.

**FOUNDER,** in the sea-language, is applied to a ship, which from some extraordinary leak, or other accident, she sinks; when she is said to founder.

**FOUNDERING,** among farriers, signifies a disease of which there are two kinds, in the feet and in the chest. Foundering in the feet is occasioned by great heats, colds, hard labour, &c. by which the feet acquire such a numbness that the horse can hardly stand. Foundering in the chest is generally occasioned by eating or drinking too much when the horse is hot, and riding him afterwards.

**FOUNDERY,** the art of casting all sorts of letters into different forms. It also signifies the work-house or smelting-hut where these operations are performed.

**Letter-FOUNDERY,** the art of casting letters &c. for printing. See **LETTER FOUNDERY**.

**FOUNT, or FONT,** among printers, &c. is a set of letters; and all the appendages belonging thereto, as great and small capitals, single and double letters, numerical characters, quadrats, points, rules, &c. according to their different kinds; as a fount of pica, long primer, english, pearl, &c. The letter founders have a kind of list, to regulate their founts by; for as some letters are oftener used than other, the cells or cases should be better filled than those of the letters that do not return so often: thus the *o* and *i*, for instance, are always more in quantity than the *k* or *z*. A common fount consists of 100,000 letters, whereof the *a* should have 5,000, the *c* 3,000, the *e* 11,000, the *i* 6,000, the *m* 3,000, the *k* 300, and the *x*, *y*, and *z* not much more. This proportion relates to the letters of the lower case.

**FOUNTAIN, Fons,** a spring of living water that rises out of the ground. See **SPRING**.

Fountains or sources of rivers were held sacred among the ancients, and even worshipped as a kind of divinity: and it was a point of religion, not to muddy the waters in bathing.

**Artificial FOUNTAIN, or jet d'eau,** a contrivance, whereby water is violently spouted upwards.

Some fountains are founded on the elasticity of the air, and others on the pressure of the water.

The artificial fountain (*plate XXXVI. fig. 1.*) which may be set upon either of its ends, after it has played out all its water in a jet through the spouting-pipe E, plays again afresh through the spout I, when you have turned it over like an hour-glass. The water contained in the cavity AFH runs down the curve pipe CDE, and spouts up through the jet E by the pressure of the column of water CD. But, unless the pipe GF was open at G, to let the air run up to F, and press at the top of the surface of the water in the cavity A, the water could not run down and spout at E. There is such



another pipe as GF at K, belonging to the cavity B, through which the water of the jet received in the bafon supplies the cavity B, whilst the fountain stands on the end B: but, when the fountain is inverted, it supplies B with air to let the water descend in the direction GHI, I becoming the spouting pipe.

Upon these principles depends also the alternate running and stopping of the fountain at command (*fig. 2.*) CAE is a receptacle of water close from the air's entrance, except through the pipe GF, when the cock C, by which it was filled, is stopped. There is another pipe EDHB, which goes from the bottom of the water to the jet B in the bafon DB, but is stopped by the cock H. At the lowest part of the bafon DB there is a small hole at I to let the water of the bafon DB run into the bafon GH under it: there is also a small triangular hole or notch in the bottom of the pipe FG at G. Turn the cock H, and the fountain will play some time; then stop, then play again alternately. The cause of playing and stopping is this; the water coming down the pipe EDHB would not come out at B, if the air Ss above the water were not supplied, as it dilated: now it is supplied by the pipe GF, which takes it in at the notch G, and delivers it out at F; but after some time the water which has spouted out at B, falling down into the bafon DB, rises high enough to come above the notch G, which stops the passage of the air, so that the air Ss above the water in the vessel CAE cannot sufficiently press for want of a supply, and the fountain ceases playing. Now the water DB runs down into the lower bafon HG, through the hole I, till it falls below the top of the notch G, and then the air runs up into the upper receptacle again, and supplying the air at Ss, the fountain plays again. This is seen a little before-hand by a skin of water on the notch G, before the air finds passage, and then you command the fountain to play. The hole I must be less than that of the jet, otherwise the water would all run out into the lower bafon, without rising high enough to stop the notch G.

In the next fountain AB (*fig. 3.*) the air is condensed at the top of the water by means of a syringe, sometimes by blowing in; and the air and water are retained by the cock C, which must be opened, before it can play; then the water, strongly pressed by the condensed air at SS, goes through the pipe *a* and the adjutage *b* with great force, in jets of several figures according to the spouting-pipes put on at *b*.

In the fountain (*fig. 4.*) the air, being compressed by the concealed fall of waters, makes a jet, which seen for a while is looked upon as a perpetual motion by the ignorant.

The boxes CE and DYX being close, you only see the bafon ABW, with a hole at W, into which the water spouting out at B falls; but that water, going down the hole W, does not come up again at W, but runs down through the pipe WX into the box DYX, from whence it drives out the air through the ascending pipe YZ into the cavity of the box CE, where, pressing upon the water that is in it, it forces it out through the spouting-pipe OB, as long as there is any water in CE: so that this whole play is only whilst the water contained in CE, having spouted out, falls down through the pipe WX into the cavity DYX. The force of the jet is proportional to the height of the pipe WX, or of the boxes CE and DYX above each other. The height of the water, measured from the bafon ABW to the surface of the water in the lower box DYX, is always equal to the height measured from the top of the jet to the surface of the water in the middle cavity at CE. Now since the surface CE is always falling, and the water in DY always rising, the height of the jet must continually decrease, till it is shorter by the height of the depth of the cavity CE, which is emptying, added to the depth of the cavity DY, which is always filling; and, when the jet is fallen so low, it immediately gives over. In the figure the air is represented by points.

To prepare this fountain, which is generally done privately first, pour in water at W, till the cavity DXY be full; then turn the fountain over, and the

water will run from the cavity DXY into the cavity CE, which is full, when the water runs out at B held down. Set the fountain up again as if nothing had been done to it. When you would make it play, pour in about a pint of Water into the bafon ABW, and when the pipe WX is filled, the fountain will play, and continue so to do, as long as there is water in CE. You may pour the water left in the bafon ABW into any vessel, and invert the fountain, which, when set upright, will be set a playing by putting back the water poured out into ABW, and so toties quoties.

The following is a fountain invented by Dr. Defaguliers to play by the spring of the air, increased by the heat of the sun; which also serves for a dial at the same time.

GNS (*plate XXXIV. fig. 9.*) is a hollow globe of thin copper eighteen inches in diameter, supported by a small inverted bafon, standing on a frame with four legs ABC, which have between them at the bottom a large bafon a foot in diameter. Along the leg C comes a concealed pipe, going from G the bottom of the inside of the globe, which pipe comes along HV to join in an upright pipe *u* I, to make a jet at I. The short pipe I *u*, going to the bottom of the bafon, has a valve at V under the horizontal part Hu, and another valve at V above it under the cock at K. The north pole N has a screw to open a hole whereby to fill the globe with water. The globe being half filled with water, set the machine in a garden, and the heat of the sun rarefying the air, as it heats the copper, the air will press hard upon the water, which coming down the pipe GCHVI, will lift up the valve V, but shut the valve *u*, and, the cock being open, spout out at I, and continue some time, if the sun shine and the adjutage be small. At night, as the air condenses again by the cold, the outward air, pressing into the adjutage I, will shut the valve V, but pressing on the bafon DuH, it will push up the water which has been played in the day-time through the valve *u*, and the pipe uHG into the globe, so as to fill it up again the same height as at first, and the next sun-shine will cause it to play again, &c.

The use of the cock is to keep the fountain from playing till you think proper: and a small jet will play six or eight hours. If the globe be set for the latitude of the place and rectified, before it be fixed, with the hour-lines or meridians drawn upon it, the hours marked, and the countries pointed on it, as in the common globe, it will be a good dial.

FOURCHEE, or FOURCHY, in heraldry, an appellation given to a cross, forked at the ends.

FOURCHER, or FOURCHING, in law, signifies the delaying or putting off an action, which might have been brought to a determination in a shorter time.

FOURTH, in musick, one of the harmonick intervals. It consists in the mixture of two sounds, which are in the ratio of 4 to 3; that is, of sounds produced by chords, whose lengths are to each other as 4 to 3.

FOWL, among zoologists, denotes the larger sort of birds, whether domestick or wild: such are geese, pheasants, partridges, turkies, ducks, &c.

FOX, *Vulpes*, in zoology, an animal of the dog-kind, which much resembles the common dog in form, and is of the size of a spaniel: it is chiefly distinguished by its long and bushy tail, with the tip white. The fox is a native of most northern countries. That of Siberia is about the size of a common kind; but its head is larger, and its tail not only bigger and more bushy, but all of one colour.

FOX-GLOVE, *Digitalis*, in botany. See the article DIGITALIS.

FRACHES, in glass-making, flat iron pans, wherein the new-made vessels are put, to be removed gradually from the fire.

FRACTION, in arithmetick, or, as it is sometimes called, a BROKEN NUMBER, is that which represents a part or parts of any thing proposed, and is generally expressed by two numbers placed one above the other, with a line drawn between them:

Thus  $\left\{ \begin{array}{l} 3 \text{ is the numerator,} \\ 4 \text{ is the denominator;} \end{array} \right.$



the denominator denoting how many parts the thing or unity is supposed to be divided into, and the numerator shews how many of these parts are contained in the fraction. Again, fractions are of three sorts, that is, vulgar, decimal, and algebraical, or literal.

1st. Decimal fractions, which is the most elegant and natural way of dividing unity, always supposes the integer divided into 10, 100, 1000, &c. accordingly as preciseness in the operation is required: hence the denominator being known, needs not be expressed, but the fraction may be set down in the same manner as a whole number, only taking care to prefix its distinguishing point, or comma; so  $\frac{5}{10}$  will be expressed by .5,  $\frac{5}{100}$  by .05, and  $\frac{75}{100}$  by .75, &c. See DECIMALS.

2d. Vulgar fractions are of three sorts, viz. simple or proper, improper, and compound: a simple, or proper fraction hath its numerator always less than its denominator, and consequently the value of the fraction is always less than unity,  $\frac{3}{4}$ ,  $\frac{1}{2}$ ,  $\frac{2}{3}$ , &c.

An improper fraction is that whose numerator is greater than the denominator; as,  $\frac{5}{4}$ ,  $\frac{19}{10}$ ,  $\frac{340}{6}$ , &c.

A compound fraction is one which has more numerators and denominators than one, and may always be distinguished by the word *of* being put between them, as  $\frac{2}{3}$  of  $\frac{3}{4}$ ,  $\frac{3}{4}$  of  $\frac{6}{10}$  of  $\frac{9}{12}$ , &c. The formation of these fractions is easy, for 7 pence is easily known to be  $\frac{7}{12}$  of a shilling; and one shilling is  $\frac{1}{20}$  of a pound; therefore 7 pence is  $\frac{7}{12}$  of  $\frac{1}{20}$  of a pound. Numberless other examples might be given, but we apprehend the following will be sufficient to shew the nature of them.

All compound fractions are reduced to single ones, by the following

Rule.—Multiply all the numerators into one another for a numerator, and all the denominators into one another for the denominator.

Thus the  $\frac{1}{3}$  of  $\frac{3}{4}$  of  $\frac{2}{5}$  will become  $\frac{6}{60}$ , or  $\frac{1}{10}$ .

For  $1 \times 3 \times 2 = 6$ , the numerator, and  $3 \times 4 \times 5 = 60$ , the denominator.

To alter or change different FRACTIONS into one Denomination retaining the same Value.—In order to gain a clear understanding of this proposition, it will be convenient to premise this lemma, viz. If a number multiplying two numbers produce other numbers, the numbers produced from them shall be in the same proportion that the numbers multiplied are.

That is, if both the numerator and denominator of any fraction be equally multiplied into another number, their products will retain the same value with that fraction.

As in these  $\frac{2}{3} \times \frac{2}{2} = \frac{4}{6}$ . Or,  $\frac{2}{3} \times \frac{3}{3} = \frac{6}{9}$ . Or,  $\frac{2 \times 5}{3 \times 5} = \frac{10}{15}$ , &c.

That is,  $\frac{2}{3}$  and  $\frac{4}{6}$ , or  $\frac{2}{3}$  and  $\frac{6}{9}$ , or  $\frac{2}{3}$  and  $\frac{10}{15}$ , are of the same value in respect to the whole or unit.

From hence it will be easy to conceive, how two or more fractions, that are of different denominations, may be altered or changed into others that shall have one common denominator, and still retain the same value.

Example.—Let it be required to change  $\frac{2}{3}$  and  $\frac{3}{7}$  into two other fractions that shall have one common denominator, and yet retain the same value.

According to the foregoing lemma, if  $\frac{2}{3}$  be equally multiplied by 7, it will become  $\frac{14}{21}$ , viz.  $\frac{2 \times 7}{3 \times 7} = \frac{14}{21}$ .

Again, if  $\frac{3}{7}$  be multiplied equally with 3, it will become  $\frac{9}{21}$ , viz.  $\frac{3 \times 3}{7 \times 3} = \frac{9}{21}$ . And by this means we have

obtained two new fractions,  $\frac{14}{21}$  and  $\frac{9}{21}$ , that are of one denomination, and the same value with the two first proposed, viz.  $\frac{14}{21} = \frac{2}{3}$ , and  $\frac{9}{21} = \frac{3}{7}$ . And from hence arises the general rule for bringing all fractions into one denomination.

Rule.—Multiply all the denominators into each other for a new and common denominator; and each numerator into all the denominators except its own, for new numerators.

Example.—Let the proposed fractions be  $\frac{1}{3}$ ,  $\frac{2}{5}$ ,  $\frac{3}{4}$ , and  $\frac{6}{7}$ .

Then  $3 \times 5 \times 4 \times 7 = 420$ , the new and common denominator: also  $1 \times 5 \times 4 \times 7 = 140$ ,  $2 \times 3 \times 4 \times 7 = 168$ ,  $3 \times 3 \times 5 \times 7 = 315$ , and  $6 \times 3 \times 5 \times 4 = 360$ , the new numerators. Hence 420 is the common denominator; and 140, 168, 315, 360, are the new numerators; and, consequently,  $\frac{140}{420}$ ,  $\frac{168}{420}$ ,  $\frac{315}{420}$ ,  $\frac{360}{420}$ , are the new fractions required.

To bring mixed Numbers into FRACTIONS, and the contrary.—Mixed numbers are brought into improper fractions by the following

Rule.—Multiply the integers or whole numbers, with the denominator of the given fraction, and to their product add the numerator of the fraction required.

Thus,  $9\frac{4}{5}$  will become  $\frac{49}{5}$ ; and  $7\frac{6}{7} = \frac{54}{7}$ .

To abbreviate or reduce FRACTIONS into their lowest or least Denomination. Rule.—Divide the greater number by the less, and that divisor by the remainder, if there be any, and so on continually, until there be no remainder left; then will the last divisor be the greatest common measure; and, if it happen to be 1, then are those numbers prime numbers, and are already in their lowest terms; but, if otherwise, divide the numbers by that last divisor, and their quotients will be their least terms required.

Example.—Let it be required to find the greatest common measure of 72 and 108, viz. of  $\frac{72}{108}$ .

72) 108 (1

72

36) 72 (2 Here, because there is no remainder, 36 is the greatest common measure.

(0)

There 72 divided by 36 = 2, the numerator; and 108 divided by 36 = 3, the denominator, of the fraction in its lowest terms.

Algebraical FRACTIONS, are set down and managed in every respect like vulgar fractions.

Addition and Subtraction of FRACTIONS, are the methods by which fractions are added to or subtracted from one another.

Rule.—Reduce the given fractions to a common denominator, and add, or subtract the numerators; the sum or difference set over the common denominator is the sum or remainder required.

Thus,  $\frac{2}{3} + \frac{3}{4} = \frac{8+9}{12} = \frac{17}{12} = 1\frac{5}{12}$ ;  $\frac{3}{4} - \frac{2}{3} = \frac{9-8}{12} = \frac{1}{12}$ ;  $\frac{4}{5} - \frac{3}{4} = \frac{16-15}{20} = \frac{1}{20}$ .

Multiplication of FRACTIONS. Rule.—Multiply their numerators one into another to obtain the numerator of the product; and their denominators multiplied into one another shall give the denominator of the product.

Thus,  $\frac{2}{3} \times \frac{4}{5} = \frac{8}{15}$ .

If a mixed quantity is to be multiplied, first reduce it to the form of a fraction, and if any integer is to be multiplied by a fraction, you may reduce it to the form of a fraction by placing an unit under it.

Examples.  $5\frac{2}{3} \times \frac{3}{4} = \frac{17}{3} \times \frac{3}{4} = \frac{17}{4}$ ;  $9 \times \frac{2}{3} = 1 \times \frac{2}{3} = \frac{2}{3}$  = 6.

Division of FRACTIONS. Rule.—Multiply the numerator of the dividend by the denominator of the divisor, and their product shall give the numerator of the quotient: then multiply the denominator of the dividend by the numerator of the divisor, and their product shall give the denominator.

Thus  $\frac{4}{5} \div \frac{2}{3} = \frac{4 \times 3}{5 \times 2} = \frac{12}{10} = \frac{6}{5}$ .

FRACTURE, in surgery, a rupture of a bone, or a solution of continuity in a bone, when it is crushed or broken by some external cause.

Fractures generally happen when any part of the body, where a bone is situated, receives a violent shock, either by a fall or a blow with a piece of timber, &c. or by the shot of a gun. There are instances where this accident has happened from an internal disorder, to wit, from the scurvy, a caries, or the venereal disease, which have rendered the substance of a bone so brittle, that it has been fractured without any apparent external accident.



Fractures are distinguished into several classes. First, every fracture is either simple, that is, when no other parts besides the bone are injured, or compound, as where there is a wound, a dislocation, hæmorrhage, inflammation, fever, caries, or contusion of the bone; or where the bone appears to be fractured in several places at the same time. Other differences arise with regard to the situation of the fracture; sometimes it happens in the cranium, ribs, vertebræ; sometimes in the upper or lower limbs; sometimes in the middle of the bone, and sometimes in either of the extremities. Again, some fractures are transverse, others oblique. In which case it frequently happens that the points of the bones wound the neighbouring parts, pushing quite through the muscular flesh, and common integuments; or at least pricking them grievously, and bringing on pain, inflammation, tumour, and spasm. Violent contusions also may be classed under the head of fractures; for the bones in this case are frequently broke into splinters, by the falling of any heavy body upon the part, or by any violent pressure. To fractures of the bones, we may also very properly add fissures.

Fractures of bones are discoverable, 1. By the eye, when the injured part is apparently shorter than the sound; or when the patient cannot make use of it. 2. By the touch, when a preternatural inequality of the bone may be perceived; or that it bends in a part where nature did not intend it should. 3. By the ear, when upon moving the limb, the crushing of the broken bones may be heard. 4. We may strongly suspect a fracture of the part, when it has received a violent blow. And, 5. It is observable that the parts are more subject to this injury in winter than in summer. Lastly, sometimes, particularly in fractures that are made in a transverse direction, the broken parts of the bone will immediately, of themselves, recover their natural situation, and leave little room to suspect the disorder.

Great variety of mischiefs attend a fractured bone, which differ, 1. With regard to the injured part, and the nature and disposition of the neighbouring parts. 2. With regard to the manner in which fractures are made; for oblique fractures, and those whose splinters and points wound and vellicate the neighbouring parts, are much more painful and dangerous than transverse fractures. 3. We may judge of the mischief that is likely to attend a fracture, from the number of pieces into which the bone is broken. And, 4. By observing whether the fracture happened at the middle of the bone, or at its extremities. The principal inconveniencies that attend a fracture are these: the patient loses the use of the limb; the lower part of the limb will be contracted by the muscles, which will make it appear distorted and deformed; the laceration of the periosteum and the vessels of the medulla being in great danger of fistulæ and caries. When the nerves are pricked and irritated by splinters, the patient suffers great pain, convulsions, inflammations, and fever; and if any vessels suffer pressure, the common consequence of a contusion ensue. Sometimes, whilst the bone is uniting, the broken parts are supplied in too plentiful a manner with juices, and the callus is formed irregularly, which occasions a deformity of the limb.

In the cure of fractures, the surgeon's principal care should be to unite the broken bone, to which three things are necessary. 1. That the bone be restored to its natural situation, which is done by the extending and replacing it. 2. That after the bone has recovered its natural situation, it be kept there, by giving it rest, and applying proper bandages. Lastly, proper remedies must be used, in order to prevent or remedy the disorders that usually attend this accident.

FRÆNUM, or FRENUM, a bridle, in anatomy, is applied to some membranous ligaments in the body:

as, FRÆNUM *Linguae*, the ligament under the tongue. This ligament connects it with the os hyoides, larynx, and lower part of the mouth. It generally wants cutting in infants, especially when it reaches near the tip, to give sufficient room for the motion of the tongue, otherwise there could be no possibility of speech.

FRÆNUM *of the Penis*, the ligament that ties the

præputium to the lower part of the glands of the penis. There is also a small frænum fastened to the lower part of the clitoris.

FRAIGHT, or FREIGHT, in navigation and commerce, the hire of a ship, or a part thereof, for the conveyance and carriage of goods from one part or place to another; or the sum agreed on between the owner and the merchant, for the hire and use of a vessel. It also denotes the cargo or burden of a ship in goods.

FRAIL, a basket made of rushes, &c. in which figs, raisins, and the like, are packed up.

FRAIL, is also used to imply a certain quantity of raisins, about seventy-five pounds.

FRAISE, in fortification, a kind of pointed stakes fixed almost horizontally towards the field, in bulwarks of earth, on the outside of the rampart, &c. They are from seven to eight feet long, and serve to prevent the approach and scalade of an enemy, as also desertion from the place.

FRAISING *of a Battalion*, in military affairs, is lining a body of foot all round with pikes or fraises, in case of their being attacked by a body of horse.

FRAME, among painters, a kind of square consisting of four long slips of wood joined together, whose intermediate space is divided by threads into several little squares like a net, and hence called reticula. It serves to reduce figures from great to small, and vice versa.

FRAMING *of a House*, among carpenters, denotes all the timber-work therein, namely, the carcase, floors, partitions, roof, cieling, beams, ashlering, &c.

*Lingua*, FRANCA, a kind of jargon spoken up the Mediterranean, and in all the coasts of the Levant. It consists of French, Italian, Spanish, and divers other languages. Though they use the infinitive for all the tenses and moods of a verb, yet this medley is understood by sailors and merchants of every nation in the carrying on their commerce.

FRANCHISE, in law, an exemption from ordinary jurisdiction, and sometimes an immunity from tribute: it is either personal or real; that is, belonging to a person immediately, or by means of this or that place or court of immunity, of which he is either chief, or a member.—Franchise also denotes an asylum or sanctuary, where there is security for one's person, &c.

FRANCHISE *Royal*, a place where the king's writ does not run, as in the bishoprick of Durham and Palatinate of Chester, &c.

FRANCHISE, in a general sense, a privilege or exemption from ordinary jurisdiction; as that for a corporation to hold pleas among themselves to such a value, or the like.

FRANCISCAN MONKS, religious of the order of St. Francis, founded by him in the year 1209.

FRANGIPANE, a kind of exquisite perfume given to the leather of which gloves, &c. are made; so called from the inventor, a nobleman of Rome of the family of Frangipani. There is also a perfumed liquor of the same name, as also a ros solis.

FRANGULA, BLACK ALDER, a distinct genus of plants according to Tournefort, but ranked by Linnaeus among the rhamnuses.

FRANK-LAW, a word applied to the free and common law of the land, or the benefit a person has by it.

FRANK-PLEDGE, in our law, signifies a pledge of surety for the behaviour of freemen.

FRANKINCENSE. See OLIBANUM.

FRANKS, FRANKIS, or FRANQUIS, an appellation which arose in the time of the cruzades, and is given by the Turks, and other nations of Asia, to all the inhabitants of the western parts of Europe, to which they give the name of Frankistan, from Francia or France, from which the greatest part of the first Cruzades came.

FRAPPING, among sailors, the act of crossing and drawing together the several parts of a tackle, or other complication of ropes drawn tight to secure any body. The frapping always increases the tightness, or of course adds to the security acquired by the purchase.

FRAPPING



**FRAPPING a Ship**, passing four, five, or six turns of a cable round the body or hull of a ship in the middle, to secure her in a great storm, when it is apprehended she has not sufficient strength to resist the violent efforts of the waves: this expedient, however, is rarely put in practice, unless in very old ships, which the owners are willing to venture till the last.

**FRATERNITY**, in the Roman catholick countries, signifies a society for the improvement of devotion.

**FRATERNITY**, in a civil sense, a company or gild of certain artificers or traders. See **COMPANY**.

**FRATRICELLI**, *LITTLE BROTHERS*, in church history, a sect of hereticks who appeared in Italy about the year 1298, and afterwards spread all over Europe. They wore the habit of the Franciscan order, and pretended that ecclesiasticks ought to have no possessions of their own.

**FRATRIAGE**, *Fratriagium*, the partition among brothers or coheirs, coming to the same inheritance or succession.

**FRATRICIDE**, the crime of murdering one's brother. See **PARRICIDE**.

**FRAUD**, in law, signifies deceit in grants or conveyances of lands, &c. or in bargains and sales of goods, &c. to the damage of another person.

**FRAXINUS**, the ash-tree, in botany. See **ASH**.

**FREAM**, a name given by farmers to ploughed lands worn out of heart, and laid fallow till they recover.

**FRECKLES**, *Lentiginos*, spots of a yellowish colour, of the bigness of a lentile-seed, scattered over the face, neck, and hands. Freckles are either natural or proceeding accidentally from the jaundice, or the action of the sun upon the part. Heat, or a sudden change of the weather, will often cause the skin to appear of a darker colour than natural, and thereby produce what is called tan, sun-burn, and morpew, which seem to differ only in degree; and usually disappear in winter.

Persons of a fine complexion, and such whose hair is red, are the most subject to freckles, especially in those parts which they expose to the air.

To remove freckles, put juice of lemons in a glass vial, and mixing it with sugar and borax, finely powdered, let it digest 8 days, and then use it. Homberg proposes bullock's gall mixed with alum, and, after the alum has precipitated, exposed 3 or 4 months to the sun in a close vial, as one of the best remedies known for removing of freckles.

**FREE**, in a general sense, is used in opposition to whatever is constrained or necessitated. When applied to things endowed with understanding, it more peculiarly relates to the liberty of the will. See **FREEDOM**.

**FREE**, among seamen. The pump is said to free the ship, when it throws out more water than leaks into her. To free the boat, is haling or lading out the water therein.

**FREE-BENCH**, signifies that estate in copyhold which the wife, being espoused a virgin, has after the decease of her husband for her dower, according to the custom of the manor.

**FREE-BORD**, ground claimed in some places beyond or without the fence, and said to contain two foot and a half.

**FREE-CHAPEL**, is properly a chapel of the king's foundation, and by him exempted from the ordinary's visitation or jurisdiction.

**FREEDOM**, in general, the state or quality of being free.

**FREEDOM of a Corporation**, the right of enjoying all the privileges and immunities belonging to it.

**FREEDOM of the Will**, that power or faculty of the mind, whereby it is capable of acting or not acting, chusing or rejecting whatever it judges proper. Of this every man must be sensible, who finds in himself a power to begin or forbear, continue or end several actions, barely by a thought or preference of the mind.

**FREE-HOLD**, signifies lands or tenements which a person holds in fee-simple, fee-tail, or for term of life. Freehold is distinguished into freehold in deed, and freehold in law: the first of which signifies the real possession of lands, &c. in fee, or for life; the other is the right that a person has to such lands or tenements before his entry.

**FREE-HOLD** is also extended to such offices as a man holds in fee, or during life. See **FREE**. A freehold, by the common law, cannot commence in futuro, but it must take effect presently, either in possession, reversion, or remainder; and where a person pleads *liberum tenementum*, or freehold, generally the law intends he has an estate in fee, and not barely for life. Whatever is part of the freehold, goes to the heir; and things fixed thereto, may not be taken as a distress for rent, or in execution, &c. No person shall distrain freeholders to answer for their freehold, or any thing concerning the same, without the king's writ. By the ancient laws of Scotland, freeholders are called milites, or knights.

**FREEZE**, or **FRIEZE**, in commerce, a coarse kind of woollen stuff, or cloth, for winter wear; so called, as being freezed or napped on each side.

**FREEZING**, in philosophy, the same with congelation. See **CONGELATION** and **FROST**. Philosophers are by no means agreed as to the cause of this phenomenon. The Cartesians account for it by the recess or going out of the ethereal matter from the pores of the water. The Corpuscularians, on the other hand, attribute it to the ingress of frigorifick particles, as they call them; and Hobbes asserts, that these particles are nothing else but common air, which entangling itself with the particles of water, prevents their motion. Others will have a kind of nitrous salt to be the cause of congelation, by insinuating itself between the particles of water, and fixing them together, like nails. And, indeed, it seems probable that cold and freezing do arise from some substance of a saline nature floating in the air; since all salts, and particularly nitrous ones, when mixed with ice and snow, greatly increase their cold, and even bulk.

Boerhaave observes, that it is extremely difficult to exhibit to the eye the precise degree of cold wherein ice begins to form; since heat and cold, once given to a body, adhere long to it before they quit it. When the air, therefore, is in such a state as keeps Fahrenheit's thermometer at 32 degrees, water will not freeze; because water being 800 times denser than air, retains the warmth considerably longer than air. If any person, therefore, is curious to know in what degree of cold water begins to freeze, let him first suspend a thermometer in a free open air on all sides; and then wetting a thin linen cloth with clear water, and hanging it likewise in the open air, it will grow stiff upon the first access of the freezing cold, and thereby shew when water is beginning to turn to ice.

By means of freezing, wine, vinegar, and malt-liquors may be reduced to a fourth part of their quantity, without any considerable loss of their essential parts; since only the aqueous parts freeze, leaving the vinous parts concentrated or brought into less compass, and capable of being transported with less expence, and keeping for several years.

**FREEZING-MIXTURE**. Mr. Boyle shews in his history of cold, that not only all kinds of salts, but likewise spirits, sugar, and saccharum saturni, mixed with snow, are capable of freezing most fluids; and the same effect was also produced by the mixture of oil of vitriol, or spirit of nitre in snow.

**FREEZING Rain**, or *raining Ice*, an uncommon kind of rain that fell in December, 1672, in the west of England, as we have an account in the *Phil. Trans.*

This rain, as soon as it touched a bough, &c. immediately settled into ice, and, by multiplying, and increasing the icicles, broke all down with its weight. The rain that fell on the snow, immediately froze without sinking into it. The ice on a sprig of ash, just  $\frac{1}{2}$  of a pound, weighed 16 pounds.

Dr. Beale observes, that there was no considerable frost on the ground all the while; whence, he concludes, that a frost may be very fierce on the tops of some hills, &c. while in other places it keeps at 2 or 4 feet distance above the ground, rivers, &c. and may wander about very furious in some places, and remits in others, not a great way off. This frost was followed by glowing heats, and a great forwardness in the vegetation of trees, &c.



**FRESH**, in general, something that is new, pure and good; or, that has little or no salt in it.

**FRESH DISSEISIN**, in law, such a disseisin as a man may defeat of himself, and by his own power, without the assistance of the king or the law; as where it is of short continuance, viz. not above 15 days. See the article **DISSEISIN**.

**FRESH FINE**, a fine that was levied within a year past. See the article **FINE**.

**FRESH FORCE**, signifies a force newly done; as where a person is disseised of any lands or tenements within a city or borough, or deforced of lands after the decease of his ancestor, to whom he is heir; the person having right may within 40 days after the force committed, or title to him accrued, bring his assise or bill of fresh force, and recover the lands. See **FORCE**.

**FRESH SHOT**, in the sea language, signifies the falling down of any great river into the sea, by means whereof the sea hath fresh water a good way from the mouth of the river. As this is more or less, they call it a great or small fresh shot.

**FRESH SPELL**, in the sea-phraze, a fresh gang to relieve the rowers in the long-boat.

**FRESH SUIT**, in law, is such a close and active prosecution of an offender, as never ceases from the time of the offence committed or discovered, till he is apprehended. The benefit and effect of this pursuit of a felon is, that the party pursuing shall have his goods again, which otherwise would be forfeited to the king.

**FRET**, or **FRETTE**, in architecture, a kind of knot or ornament, consisting of two lists or small fillets variously interlaced or interwoven, and running at parallel distances equal to their breadth. Every return and intersection of these frets must be at right angles, otherwise they lose all their beauty, and become perfectly gothick. Sometimes the fret consists but of a single fillet, which, if well disposed, may be made to fill its space exceedingly well. Frets were very much used by the ancients especially on even flat members, or parts of a building, as the faces of the corona, and eaves of corniches; under the roofs, soffits, &c. and on the plinths of bases, &c.

**FRET**, in heraldry, a bearing composed of six bars, crossed, and variously interlaced.

**FRET**, in musick, signifies a kind of stop on some instruments, particularly bass-voles and lutes. Frets consist of strings tied round the neck of the instrument, at certain distances, within which such and such notes are to be found.

**FRET-WORK**, that adorned with frets. It is sometimes used to fill up and enrich flat empty spaces; but is mostly practised in roofs, which are fretted over with plaster-work.

**FRETTY**, in heraldry, an appellation given to bearings made up of six, eight, or more bars laid across each other, in the manner of frets.

**FRIABLE**, among naturalists, an appellation given to bodies that are easily crumbled to pieces: such are the free stone, pumice-stone, &c.

**FRIAR**, or **FRIER**, among ecclesiastical writers, is a general name for monks of all orders, because they form a kind of fraternity, or brotherhood, between the several religious persons of the same convent or monastery.

**FRIAR'S COUL**, among gardeners, a name given to several species of arum. See the article **ARUM**.

**FRICTION**, the act of rubbing the surface of one body against that of another.

The word is Latin, *frictio*, and derived from *frico*, to rub. Among machines, some have a great deal more friction than others, and some very little. Thus a pendulum has little or no friction, but what arises from the resistance of the air. But a carriage has a great deal of friction: for upon plain ground a loaded cart requires the strength of several horses to draw it along; and all or most of this force is owing to its friction. All compounded machines have great friction, and so much the more as they consist of more parts that rub against one another. And there is a great variety in several sorts of bodies, as to the quantity of friction they have; and even in the same bodies under

different circumstances: upon which account it will be impossible to give any standing rules, by which its quantity can be exactly determined. All we can do is to lay down such particular rules as have been deduced from experiments made upon particular bodies; which rules will require some variation under different circumstances, according to the judgment and experience of the artist.

1. Wood and all metals, when oiled or greased, have nearly the same friction: and the smoother they are, the less friction they have: yet metals may be so far polished as to increase friction by the cohesion of their parts. Wood slides easier upon the ground in wet weather than in dry; and easier than iron in dry weather: but iron slides easier than wood in wet weather. Lead makes a great deal of resistance. Iron or steel running in brads, makes the least friction of any. In wood acting against wood, grease makes the motion twice as easy, or rather  $\frac{2}{3}$  easier. Wheel-naves greased or tarred, go four times easier than when wet. Metals oiled makes the friction less than when polished, and twice as little as when unpolished. In general, the softer or rougher the bodies, the greater is their friction.

2. As to particular cases: a cubick piece of soft wood of eight pounds weight, moving upon a smooth plane of soft wood, at the rate of three feet per second; its friction is about  $\frac{1}{3}$  the weight of it: but if it be rough, the friction is little less than half the weight. Upon the same supposition, other soft wood upon soft wood very smooth, the friction is about  $\frac{1}{4}$  the weight. Soft wood upon hard or hard upon soft,  $\frac{1}{5}$  or  $\frac{1}{6}$  the weight. Hard wood upon hard wood,  $\frac{1}{7}$  or  $\frac{1}{8}$  the weight. Polished steel moving on steel or pewter,  $\frac{1}{4}$  the weight: moving on copper or lead,  $\frac{1}{5}$  the weight: on brass  $\frac{1}{6}$  the weight. Metals of the same sort have more friction than different sorts.

The friction, *ceteris paribus*, increases with the weight almost in the same proportion. The friction is also greater with a greater velocity, but not in proportion to it, except in very few cases. A greater surface also causes something of more friction, with the same weight and velocity: yet friction may sometimes be increased by having too little surface to move on; as upon clay, &c. where the body sinks.

3. The friction arising from the bending of ropes about machines, differs according to their stiffness, the temper of the weather, degree of flexibility, &c. but, *ceteris paribus*, the force or difficulty of bending a rope is as the square of the diameter of the rope, and its tension directly; and the diameter of the cylinder or pulley it goes about, reciprocally. A rope of one inch diameter, whose tension, or weight drawing it, is five pounds, going over a pulley three inches diameter, requires a force of one pound to bend it.

4. The resistance of a plane moving through a fluid is as the square of the velocity; and putting  $v$  = velocity in feet, in a second, it is equal to the weight of a column of the fluid, whose base is the plane, and height  $\frac{v^2}{64}$ .

And in a globe it is but half so much.

5. The friction of a fluid running through a tube is as the velocity and diameter of the tube. But the friction is greater in respect to the quantity of the fluid, in small tubes than in large ones; and that reciprocally as their diameters: but the absolute quantity of the friction in tubes is but very small, except the velocity be very great, and the tube very long.

But if a pipe be divided into several less ones, whose number is  $n$ ; the resistance arising from the friction will be increased as  $Vn$ . For the area of the section of any one pipe will be  $\frac{1}{n}$ , and the friction being as the circumference, will be as  $\frac{1}{Vn}$ ; and therefore the friction

in all of them, will be  $\frac{n}{Vn}$ , or as  $Vn$ .

6. As to the mechanick powers. The single lever makes no resistance by friction: but if by the motion of the lever in lifting, the fulcrum, or place of support, be changed further from the weight; the power will be decreased thereby.



7. In any wheel of any machine, running upon an axis; the friction on the axis is as the weight upon it, the diameter of the axis, and the angular velocity. This sort of friction is but small.

8. In the pulley, if  $p, q$ , be two weights, and  $q$  the greater; and  $W = \frac{4pq}{p+q}$ ; then  $W$  is the weight upon the axis of the single pulley: and it is not increased by the acceleration of the weight  $q$ , but remains always the same. The friction of the pulleys is very considerable, when the sheaves rub against the blocks; and by the wearing of the holes and axels. The friction on the axis of the pulley is as the weight  $W$ , its angular velocity, the diameter of the axis directly, and the diameter of the pulley inversely. A power of 100 pounds, with the addition of 50 pounds, will but draw up 500 pounds with a tackle of five; and 15 pounds over a single pulley will draw up only 14 pounds.

9. In the screw, there is a great deal of friction: those with sharp threads have more friction than those with square threads: and endless screws have more than either. Screws with a square thread raise a weight with more ease than those with a sharp thread. In the common screw the friction is so great, that it will sustain the weight in any position given, when the power is taken off; and therefore the friction is at least equal to the power. From whence it will follow, that in the screw. The power must be to the weight or resistance, at least as twice the perpendicular height of a thread, to the circumference described by one revolution of the power; if it be able to raise the weight, or only sustain it. This friction of the screw is of great use, as it serves to keep the weight in any given position.

10. In the wedge, the friction is at least equal to the power, as it retains any position it is driven into; therefore in the wedge, the power must be to the weight at least as twice the base to the height to overcome any resistance.

11. To find the friction of any engine, begin at the power, and consider the velocity and the weight at the first rubbing part; and estimate its quantity of friction by some of the foregoing articles; then proceed to the next rubbing part and do the same for it, and so on through the whole. And note, that something more is to be allowed for increase of friction, by every new addition to the power.

**FRICTION**, in medicine, the rubbing a diseased part, either with or without unguents, oils, &c. Dr. Cheyne greatly recommends friction with a flesh-brush to persons of weak nerves and sedentary lives; by which means a full and free perspiration would be promoted, and obstructions removed, to the great relief of many valetudinarians.

**FRIEZE**, or **FREEZE**, in architecture, a large flat member that separates the architrave from the cornice: it is called phrygium, as being frequently adorned with figures in basso relievo, somewhat in imitation of embroidery that first came from Phrygia, where they excelled in this art; and sometimes zophoros, as it is usual for animals to be represented thereon. It is called fascia or a flat band; and commonly the frieze is of the same height with the architrave.

There are as many kinds of friezes as there are orders of columns. Vitruvius makes the frieze in the Tuscan flat and plain, and 30 minutes high.

In the Dorick, Vitruvius and Vignola make the frieze flat, and only carved with triglyphs and metopes, and 30 or 45 minutes in height.

In the Ionick, Vitruvius makes the frieze flat, but commonly carved with acanthus leaves, lions, men, &c. and 30 minutes in height.

In the Corinthian he makes it flat, but carved with acanthus leaves, and men, &c. and  $37 \frac{2}{3}$  minutes in height.

In the Composite he makes the frieze flat, but beset with cartouches, and carved between each, and  $52 \frac{1}{2}$  minutes in height.

**FRIEZES** are likewise variously denominated from the variety of their ornaments, as,

*Convex and pulvinated* **FRIEZES**, are such whose profile is a curve, and the best proportion is when drawn

on an equilateral triangle. In some of them the swelling is only at the top, as in a console; in others at the bottom, as in a balluster.

*Flourished* **FRIEZES**, such as are enriched with imaginary foliage, as the Corinthian frieze of the frontispiece of Nero; or with natural leaves, either in clusters or garlands, or continued; as in the Ionick of the gallery of Apollo in the Louvre.

*Historical* **FRIEZES**, are such as are adorned with basso relievo's history-pieces, sacrifices, inscriptions, &c. as in Titus's arch at Rome.

*Marine* **FRIEZES**, such friezes in a ship, &c. as represent sea-horses, tritons, shells, baths, grotto's, &c.

*Rustick* **FRIEZES**, such whose courses are rusticated or embossed, as in the Tuscan frieze of Palladio.

*Symbolical* **FRIEZES**, such on which there are representations of things peculiar to religion, as the apparatus of sacrifices, and the like; as on the frieze of the temple behind the capitol at Rome.

**FRIGATE**, a ship of war, usually consisting of two decks, light built, and designed for swift sailing. When it hath but one deck, and consequently is of a smaller size, it is called a light frigate.

**FRIGATOON**, a vessel commonly used in the Adriatick; square sterned, without any fore-mast, and only a main-mast, mizzen, and bowsprit.

**FRIGID** is applied to a jejune style, that is unanimated by any ornaments, and consequently without any force or vigour.

**FRIGID Zone.** See **ZONE**.

**FRIGIDITY** denotes impotence, or want of ability, as to the performance of the conjugal duties.

**FRIGORIFICK**, are small particles of matter, which, according to Gassendus and others, being actually and essentially cold, and penetrating other bodies, produce in them that quality which we call cold.

**FRIT**, or **FRITT**, the ingredients of which glass is made calcined in a furnace. It is a salt drawn from the ashes of the plant kali, or from fern, mixt with sand flint, and baked together into an opaque mass, which is usually called kelp. See the article **GLASS**.

**FRIZE**, a kind of woollen cloth, on one side of which there are made some little naps of the wool, whence it takes its name.

**FRIZING of Cloth**, may be performed two ways: one by means of two workmen that conduct a kind of plank that serves as a frizing instrument: the other by a mill worked by water, or a horse, &c. This machine consists of three parts, the frizer or crisper, the frizing table, and the drawer or beam. The two first are two equal planks, each ten feet long, and fifteen inches broad, the frizing table being covered with coarse woollen stuff, and the frizer incrustated with cement. The beam is a wooden roller, beset all over with short points of wire.

**FROGS**, *Rana*, in zoology, a genus of amphibious animals, the body of which is broad and short, without a tail, and furnished with four legs.

**FROG**, in farriery, the same with frush. See **FRUSH**.

**FRONT**, the forehead.

**FRONT**, in perspective, the orthographical projection of any object upon a parallel plane; or a representation of that part of it directly opposite to the eye; which is more usually called orthography.

**FRONT**, in fortification, the tenaille or face of a place, is that part comprized between the points of any two neighbouring bastions, namely, the courtin, the two flanks raised on the courtin, and the two faces of the bastions that look towards one another.

**FRONT**, in architecture, the principal face or side of a building, that is presented to the chief view.

**FRONTAL**, in architecture, a pediment or fronton, that is sometimes placed over a little door or window.

**FRONTAL**, **FRONTLETT**, or *Brow band*, among the Jews: It consisted of four pieces of vellum, on each of which was some text of scripture written, which they laid on a piece of black calves leather, and tied it with thongs round their foreheads.

**FRONTAL**, in physick, any external medicine or topick applied to the forehead: more particularly it signifies a refrigerating and hypnotick remedy, prepared of



of cold cephalicks bruised and tied up in a linen bag, four or five fingers in breadth.

**FRONTALIS**, a muscle belonging to the forehead.

**FRONTATED**, *Frontatus*, in botany, relates to the leaf of a flower, that grows broader and broader, till perhaps it terminates in a right line; and is in opposition to *conspidated*, when the leaves of a flower end in a point.

**FRONTIER**, the confine, border, or extremity of any country.

**FRONTISPIECE**, in architecture, the portrait or principal face of a building.

**FRONTISPIECE**, is also used to signify an ornament fronting the title page of a book, which in some measure expresses the subject treated of.

**FROST**, such a degree of cold as concretes water and other liquid substances. Some of the most severe frosts in this climate, of which we have an account, were those in 1709 and 1740.

**Hoar-Frost**, a moderate degree of frost whereby the dew is congealed upon the grass, &c. every morning in autumn, before the sun rise, so that the face of the ground and every thing upon it that lies in the open air looks all hoary and white. This hoar-frost consists of an assemblage of small particles of ice, according to the different state in which the cold finds the parts of the vapours of which it is composed.

**FROTH**, a white, tenuous, light substance, formed by vehement agitation, on the surface of the fluids, being entirely composed of little spherules or globules.

**FROTH-SPITTLE**, or **CUCKOO-SPITTLE**, a name given to a white froth, or spume, very common in the spring, and first months of the summer, on the leaves of certain plants, particularly on those of the common white-field lychnis, or catch-fly, thence called by some spitting poppy.

All writers on vegetables have taken notice of this froth, though few have understood the cause or origin of it till of late; being formed by a little leaping animal, called by some, the flea-grass-hopper; by applying its anus close to the leaf, and discharging thereon a small drop of a white viscous fluid, which, containing some air in it, is soon elevated into a small bubble; before this is well formed, it deposits such another; and so on, till it is every way overwhelmed with a quantity of these bubbles, which form the white froth which we see.

**FRUCTIFEROUS**, signifies properly any thing that produces fruit; but, in a more large and figurative sense, it is used by some, particularly lord Bacon, for such experiments in natural philosophy, as prove advantageous to the experimenter in point of gain or profit.

**FRUCTIFICATION**, among botanists, comprehends both the flower and fruit of plants, which cannot be well separated; for though the fruit does not swell and ripen till after the flower is fallen, its rudiment, or first beginning, is in the flower, of which it properly makes a part. Linnæus defines the fructification to be a temporary part of vegetables allotted to generation, terminating the old vegetable and beginning the new: it consists of seven principal parts, viz. 1. the calyx; 2. the corolla; 3. the stamina; 4. the pistillum; 5. the pericarpium; 6. the semina, or seeds; 7. the receptacle. See them explained under their respective articles.

**FRUGIVOROUS BIRDS**, are such as feed on fruits, either wholly or in part.

**FRUIT**, in general, includes whatever the earth produces for the nourishment and support of man and other animals, as herbs, grain, hay, corn, &c.

**FRUIT**, more properly signifies the production of a tree or plant for the propagation or multiplication of its kinds; in which sense the word includes all kinds of seeds with their furniture; but botanists usually understand by it that part of a plant wherein the seeds are contained.

The fruit of plants is the product or result of a flower, or that for whose production, nutrition, &c. the flower was intended, and all plants the essential parts of the fruit appear to be only continuations or expansions of those which are seen in the other parts of the

tree, and have a communication with the remotest parts, that is, the same fibres, which constitute the root, trunk, and boughs, are extended into the fruit itself.

Fruits being known by the different structure or formation of their parts, botanists have therefore applied particular denominations to them, in order to render their description more certain; as the nut, berry, pod, capsule, &c.

Fruits are serviceable in guarding, preserving, and feeding the inclosed seed; in filtrating the coarser, more earthy, and strong parts, of the nutritious juice of the plant, and retaining it to themselves, sending none but the most pure, elaborated, and spirituous parts to the seed, for the support and growth of the tender, delicate embryo, or plantule therein contained.

The use of fruits might be rendered much more extensive than it is: many fruits which do hurt when eaten raw, would make wines equal in flavour to many of those now obtained at a great expence from abroad; and lands, which are not fit for bearing corn, might be a proper soil for bearing trees and shrubs producing such fruits. — Cherries properly managed make an excellent wine; and, as they are replete with juice, are therefore capable of producing large quantities: the mussel-plumb, which grows wild, makes a very agreeable wine of considerable strength, and, by distillation, affords a pleasant brandy. Gooseberry and currant wine, in particular, if kept to a proper age, is little inferior to the very high priced wines which our good friends of France supply us with.

**FRUITERY**, a place for the keeping of fruit, a fruit-house, or fruit-loft. A fruitery should be inaccessible to anything of moisture, and should be, as much as possible, so even to frost.

**FRUMENTACEOUS**, a term applied, by botanists, to all such plants as have a conformity with wheat, in respect of the fruits, leaves, ears, or the like.

**FRUSH**, or **FROG**, among farriers, a sort of tender horn which arises in the middle of a horse's sole; and, at some distance from the toe, divides into two branches, running towards the heel, in the form of a fork. The frush is a part of a horse's foot, the top of which only should be pared, and that every time the foot is pared, otherwise it is apt to corrupt.

**FRUSTUM**, in mathematicks, a part of some solid body separated from the rest.

**FRUSTUM**, of a pyramid, or cone, is a piece or part thereof cut off, generally by a line parallel to the base. The solidity of the frustum of a square pyramid may be found by the following theorem.

To the rectangle of the sides of the two bases add the sum of their squares; that sum being multiplied into one third of the frustum's height, will give its solidity.

The solidity of the frustum of a cone may be found by the following theorem. To three times the rectangle of the two diameters add the square of their difference: that sum multiplied by the height will give the solidity.

**FRUTICOSE STALKS**, among botanists, those with a hard woody substance.

**FUCUS**, in botany, a genus of submarine plants, belonging to the cryptogamia class of Linnæus. The fucus consists of a tough matter, formed into a kind of leaves, which have some appearance of fructification, in punctated tubercles, covering oblong vesicles, supposed by Linnæus to be male flowers; and smooth, roundish vesicles, hollow and interwoven with filaments, which appear to him to be female flowers. There are a great many species of fucus with broader or narrower leaves, and other peculiarities; one of which, the broad-leaved, serrated fucus, grows to the height of 6, 8, or more inches.

**FUCUS**, also signifies any kind of paint, which the ladies, in particular, use to heighten their complexions, and consequently improve their charms.

**FUEL**, or **FEWEL**, literally signifies any thing that feeds or supports a fire; but in a figurative sense it is applied to whatever increases the passions of the mind, or the diseases of the body.

**FUGA VACUI**, in the ancient philosophy, a supposed aversion in nature to a vacuum.

**FUGALIA**,



**FUGALIA**, in antiquity, a festival celebrated among the Romans. Some suppose it to be the same with the regifugium, and others the same with poplifugium.

**FUGITIVE**. This word has various significations; it denotes a person obliged to leave his native country. It also signifies one who breaks out of prison, and in the Roman law, a slave who is apt to run away from his master.

**FUGUE**, in music; of this there are three sorts, a single, double, and counter fugue; the first is when some point consisting of 4, 5, 6, &c. notes is begun by one single part, and then seconded by a third, fourth, fifth, and sixth part; the leading part still flying before those that follow. Double fugue, when two points move together in a fugue; and counter fugue when they move contrary.

**FULIGNOUS**, whatever proceeds from a thick footy smoke, such as litharge and lamp-black.

**FULL MOON**, *Plenilunium*, that phase of the moon, when, in her opposition to the sun, her whole face is enlightened; at which time only eclipses of the moon happen. See the article **MOON**.

**FULLER**, one employed in fulling, milling, or scouring cloth, &c.

**FULLER'S EARTH**, *terra fullonica*, in natural history, a soft, greyish, brown, dense, and heavy marle: when dry, it is of a greyish, ash-coloured brown, in all degrees, from very pale to almost black, and it has generally something of a greenish cast: it is very hard and firm, of a compact texture, of a rough and somewhat dusty surface, that adheres slightly to the tongue: it is very soft to the touch, not staining the hands, nor breaking easily between the fingers: it has a little harshness between the teeth, and melts freely in the mouth: thrown into water, it makes no ebullition, or hissing, but swells gradually in bulk, and falls into a fine soft powder. It makes no effervescence with aquafortis.

It is of great use in scouring cloths, stuffs, &c. imbibing all the grease and oil used in preparing, dressing, &c. of the wool, for which reason it is made a contraband commodity, and is not to be exported under the penalty of one shilling for every pound weight. See the article **FULLING**.

**FULLER'S WEED**, in botany, a name sometimes given to the dipsacus, or teasel. See **DIPSACUS**.

**FULLING**, the art or act of scouring and pressing cloths, stuffs, stockings, &c. to cleanse, thicken, and render them more firm and strong, which is done by means of a water-mill. In the troughs of the mill are laid the cloths, stuffs, &c. intended to be fullled: then letting the current of water fall on the wheel, the mallets are successively let fall upon them, when by their weight and velocity they stamp and press the stuffs very strongly, which by this means become thickened and condensed. In this operation, fuller's earth is used with some proportion of soap; but soap alone would do much better was it not dearer than fuller's earth.

Fulling of stockings, caps, &c. is performed either with the hands or feet, or a kind of wooden machine, either armed with wooden teeth, or those of horses or bullocks. The ingredients generally used on this occasion are fuller's earth, urine, white and green soap; but water softened with chalk is far preferable.

The following is M. Colmet's method of fulling with soap, grounded on experiments made by order of the marquis de Louvois. Let a coloured cloth of about forty-five ells, be laid in the usual manner in the trough of a fulling mill, without first soaking it in water, as commonly practised in most places. To full this trough-full of cloth fifteen pounds of soap are required; one half of which is to be melted into two pails of river or spring water, made as hot as the hand can bear. Let this solution be poured by little and little, upon the cloth, in proportion as it is laid in the trough: thus it is to be fullled for at least two hours; after which, let it be taken out and stretched. This done, let the cloth be immediately returned into the same trough, without fresh soap, and there fullled two hours more: then take it out, wring it well, and express all the grease and filth. After the second fulling, dissolve the re-

mainder of the soap, as the former part, and throw it at four several times on the cloth, not forgetting to take it out every two hours, to undo the plaits and wrinkles it got in the trough. When it is sufficiently fullled, and brought to the requisite quality and thickness, it is scoured out for good in hot water, keeping it in the trough till it be thoroughly clean. As white cloths full more easily than coloured ones, a third part of the soap may be saved.

**FULLING-MILL**, a machine for fulling cloth.

This machine will be better understood by the drawing on (*plate XXXVI. fig. 5.*) than by the most accurate description.

A, the great wheel moved by horses. This turns the trundles B, C, D, and also those marked E, F, G. Then E turns the cog-wheel H, with the axis IK, and the cross-pieces L, L. I, I, I, &c. are pullies or rollers: MN, MN, are wooden beaters turning upon an axis passing through N, N. Whilst the axis IK turns about, the end I slides along the pulley I, and falling off, the part M strikes against the cloth in the trough at O, O. The lantern F carries the cog-wheel P, and the cranks Q, Q, which work the pumps T, T, by help of the levers R S, R S, moveable about a. The trundle G carries the cog-wheels V and W, and W carries the trundle X, with the piston Y, which grinds the indigo in the vessel ed, whence it flows into the vessel Z. The m, m, &c. of all the axles run in pieces of timber going across the mill, and fastened to one another, and to the walls of the house.

**FULMINATION**, in chymistry, is used in two senses; first, it signifies an explosion, being the same with detonation; and secondly, when in the depuration of the more perfect metals, upon infusing them with lead, a bright colour succeeds a kind of sulphureous cloud; during the fusion, this is called fulmination.

**FULMINATION**, in the church of Rome, the denunciation of anathemas against criminals, hereticks, &c. as also it signifies a sentence of a bishop, &c. for executing the pope's bulls.

**FUMIGATION**, in medicine, the application of fumes to particular parts of the body, such as scintious cinnabar to venereal ulcers, &c.

**FUMIGATION**, in chymistry, a kind of calcination, when metals, or other hard bodies, are corroded or softened, by receiving certain fumes for that purpose.

**FUNCTION**, the act of fulfilling the duties of any employment; it is also applied to the actions of the body, which are divided into vital, animal and natural: the vital functions are such as are so necessary, that the individual cannot subsist without their exercise; such as the motion of the heart and lungs, &c. The natural functions are such, that it can subsist a considerable time without them, as the digestion of the aliment, and its conversion into blood. Under animal functions are included the senses of touch, taste, &c. memory, judgment, and voluntary motion, without any or all of which an animal may live, but not very comfortably. In short, all parts of the body have an action peculiar to themselves.

**FUND**, in commerce, is applied to that stock or capital, which a merchant, company, or corporation, put into trade.

**FUNDS**, also signifies the publick revenue of a nation or state.

**FUND**, in anatomy, signifies the bottom, of any cavity in the body.

**FUNDAMENT**, the anus or aperture through which an animal voids the feces or recrementitious parts of his aliments.

**FUNDAMENTAL**, whatever serves as a basis or foundation for any thing.

**FUNERAL**, the obsequies and ceremonies used at interring the dead; or the last offices we pay them. We find that funeral rites varied in different ages and amongst different nations. The two principal methods of funerals were burning the dead body, or interring it.

**FUNERAL Column**, a column crowned with an urn, in which the ashes of the dead body, after it was burnt, were usually deposited; the shaft of the column being surrounded



surrounded with representations of tears or flames as emblems of grief and immortality.

**FUNERAL Games**, a part of the ancient funeral obsequies, that consisted chiefly in processions, and cruel combats of gladiators.

**FUNERAL Oration**, an eulogium pronounced in praise of a deceased person.

**FUNGUS**, in natural history, a genus of plants, ranged by Linnæus among the cryptogamia class. There are various species of the fungi, as agarick, mushrooms, &c.

**FUNGUS**, in surgery, a soft, spongy excrescence, arising in various parts of the human body, in consequence of wounds, ulcers, contusions, &c.

**FUNNEL of a Chimney**, the shaft or smallest part of the waste, where it is gathered into its least dimensions.

**FURBISHING**, the act of cleaning, scouring, and polishing arms; as guns, pistols, swords, &c.

**FURFUR**, the scurf, scales, or dandruff, which grow upon the skin.

**FURIES Eumenides Diræ**, certain goddesses whose office it was to punish the guilty after death. These were three in number, Alecto, Megæra, and Tisiphone, who were described with snakes instead of hair, and eyes like lightning, carrying iron chains and whips in one hand, and in the other flaming torches; the latter to discover, and the former to punish the guilty; and they were supposed to be constantly hovering over such persons as had been guilty of any enormous crime.

**FURLING**, among seamen, implies the action of rolling up the sail close to the yard, stay, or mast, and fastening it, by rolling a bandage or rope close about it.

**FURLING-LINE**, a line to fasten the sail; those which are made for the yards are flat and plated, generally called gaskets.

**FURLONG**, an English long measure, being equal to one eighth of a mile, or 40 statute poles or perches.

**FURLOUGH**, a licence granted by an officer to a soldier, to be absent for some time from his duty.

**FURNACE**, a vessel or utensil for maintaining a strong fire, either of coal or wood.

**FURNACE** is particularly used for a kind of oven, wherein the ores of metals, after beating, washing, &c. are melted down by a large fire of wood or coal.

*Glass-House*, **FURNACE**. See **GLASS**.

**FURNACES**, in chymistry, are of three kinds; furnaces for sand-heats; furnaces for receiving retorts, or long necks; and those called wind furnaces, used for calcinations and detonations, performed in crucibles, or vessels which are to be placed in the open fire. See **CHYMICAL**, *Laboratory*, or *Elaboratory*.

**FURNITURE**, in dialling, implies certain additional lines, &c. such as the ecliptick, circles of declination, azimuths, &c. drawn on dial-planes.

**FURR**, in commerce, signifies the skins of several wild beasts dressed in alum with the hair on. The furs most in use are those of the ermine, sable, beaver, hair, rabbit, &c.

**FURRS**, in heraldry, a bearing which represents the skins of certain beasts, used as well in the doublings of the mantles belonging to the coat armour, as in the court-armours themselves.

**FURR**, among carpenters, a piece nailed upon a rafter, to strengthen it when decayed, or to make it straight when it has sunk in the middle.

**FURRING**, among carpenters, is the regular fashioning out any part. When the main piece of the material is scanty, either by defects, wains, or want of thickness, then a piece of the same is put behind it to make good its thickness, which is called a furr.

**FURZE**, or **FUZE-BUSH**, in botany. In many countries, where there are dry banks, or dry sand or gravel, that nothing else will grow on, furze makes an extremely good fence; and is propagated either by sets or seeds, especially the latter. It will make a good hedge in three years if well weeded and carefully kept from cattle, especially sheep; and if clipped, it will thrive extremely, and be very thick; but if let grow at large, it will prove the better shelter, and yield excel-

lent fuel. It proves also an admirable covert for wild fowl. Sometimes, indeed, furze over-runs the pasture or arable lands; in which case it is to be grubbed up, or it may be destroyed by only marling the lands.

**FURZE-FAGGOTS** are used for breeming ships, when in the dock to be cleaned, or under repair.

**FUSAROLE**, in architecture, a round member carved in the manner of a collar or chaplet, with oval beads, and placed immediately under the echinus; in the Dorick, Ionick, and Composite capitals.

**FUSEE**, in clock work, is that conical part drawn by the spring, and about which the chain or string is wound; for the use of which, see **CLOCK** and **WATCH**.

**FUSEE**, or **FIRELOCK**. See **MUSKET**.

**FUSIBILITY**, in natural philosophy, that quality of bodies which renders them fusible.

**FUSIL**, in heraldry, a bearing of a rhomboidal figure, longer than the lozenge, and having its upper and lower angles more acute and sharp than the other two in the middle.

**FUSILIERS**, or **FUSILEERS**, in the military art, are foot soldiers, armed with fuses, or firelocks.

**FUSILY**, or **FUSILE**, in heraldry, signifies a field, or ordinary, entirely covered over with, or divided into fusils.

**FUSION**, the melting of metals, minerals, &c. by means of fire. In order to obtain the metal from the ore to the best advantage, the scoria or slag must be necessarily made to run thin and fluid; otherwise it entangles or inviscates the metal, and will not let it separate fully. And hence we frequently observe in the assaying of copper ores, small grains of metal interspersed here and there, among the scoria, that require to be separated by stamping and washing the whole mass; which labour might have been prevented, by using a proper degree of heat, capable of procuring a thin fusion and a suitable flux, so as to have made all the metals fall to the bottom of the crucible; which it constantly does, when the operation is well performed.

**FUST of a Column**, the same with shaft of a column. See the article **SHAFT**.

**FUSTIAN**, in commerce, a kind of cotton stuff, which appears as if whaled on one side. The best fustians are made entirely of cotton-yarn, both woof and warp; but a great many are made, of which the warp is flax, or even hemp. There are fustians made of several kinds, wide, narrow, fine, coarse; with shag, or nap, and without it.

The duties on fustians imported, are so high as to amount in a manner to a prohibition; for instance, Dutch and Milan fustians, the piece, containing two half pieces of 15 yards the half piece, pay 1l. 10s. 9 $\frac{1}{2}$ d. drawback 1l. 7s. Holmes and bervenex fustians, the bale, containing 45 half pieces, pay 15l. 8s. drawback 13l. 10s. Naples fustians, tripe or velure plain, the yard, pay 1s. 11 $\frac{1}{2}$ d. drawback 1s. 8 $\frac{1}{2}$ d. Naples fustians, wrought, called Sparta velvet, the yard pay 3s. 9 $\frac{1}{2}$ d. drawback 2s. 8 $\frac{1}{2}$ d.

**FUSTICK**, the wood of a species of mulberry, which grows naturally in the W. Indian islands and Campeachy. With us it is much used for dyeing yellow.

**FUTTOCKS**, in a ship, the timbers raised over the keel, or the encompassing timbers that make her breadth. Of these there are first, second, third, and fourth, denominated, according to their distance from the keel, those next it being called first or ground futtocks, and the others upper-futtocks: those timbers, being put together, make a frame-bend.

**FUTURE**, in general, denotes whatever regards futurity, or the time to come.

**FUTURE TENSE**, among grammarians. See the article **TENSE**.

**FUZEE**, among farriers, two dangerous splents, joining from above downwards. They differ from screws or thorough splents in this, that the latter are placed on two opposite sides of the leg. See the article **SPLINT**.



# G.

## G A G

**G**, The fifth consonant and seventh letter of the English, French and Latin alphabets, but in the Greek; and most of the oriental languages it is the third. It is one of the mutes, and cannot be sounded without the assistance of some vowel.

In English it has a hard and soft sound; hard, as in the words *game, gun, &c.* and soft, as in the words *gesture, giant, &c.* at the end of words, *gh* is pronounced like *ff*, as in the words *rough, tough, &c.* The letter *g* is also used in many words where the sound is not perceived, as in *sign, reign, &c.*

As a numeral, *G* was anciently used to denote 400; and with a dash over it, thus *Ḡ*, 40,000. In musick it is the character or mark of the treble cleff; and from its being placed at the head, or marking the first sound in Guido's scale, the whole scale took the name gamut. See **CLEFF** and **GAMUT**.

**GABEL**, in our ancient customs, signifies a duty, formerly imposed by the king or lord at pleasure.

**GABIONS**, in fortification, oſier baskets of a cylindrical figure between five and six feet high, and four broad. They are filled with earth, in order to cover the batteries from the enemy's fire. They are also used on the parapets of trenches, and placed so close together that the muzzle of a musket only can pass between them. They are often used to form a parapet to lines or lodgements, when the ground is too hard to remove.

**GABLE**, or **GABLE-END**, among bricklayers, signifies an upright triangular end of any house, from the cornish or eaves up to the top of the wall.

**GAD**, among miners, a small punch of iron, with a long wooden handle, used to break up the ore. One of the miners holds this in his hand, directing the point to a proper place, while the other drives it into the vein, by striking it with a sledge hammer.

**GAD-FLY**, or **BREEZE-FLY**, names given to the black and yellow bodied cæstrus, a fly nearly as large as the common blue flesh-fly.

**GAFOLD-LAND**, in old law-books, land liable to taxes, and let for rent.

**GAGATES**, **JET**, in natural history. See **JET**.

**GAGE**, in law-books, the same with surety or pledge.

**GAGE**, in joinery, an instrument in which a piece of wood is moveable upon a staff, so as to be set nearer or farther at pleasure. Its use is to draw a line parallel to the straight side of any board, for gaging tenons, and marking stuff for an equal thickness.

**GAGE**, among letter-founders, a piece of box, or other hard wood, variously notched; the use of which is to adjust the dimensions, slopes, &c. of the different sorts of letters.

**Sliding-GAGE**, a tool used by mathematical instrument makers, for measuring and setting off distances.

**GAGE**, or **Weather-GAGE**, in navigation, a ship is said to have gained the weather-gage of another when she makes a greater progress to the windward, or when she sails to the windward of some other.

**Sea-GAGE**, an instrument invented by Dr. Hales and Dr. Desaguliers, for finding the depth of the sea.

**Bucket-Sea-GAGE**, an instrument contrived by Dr. Hales, to find the different degrees of coldness and saltness of the sea, at different depths; consisting of a common household pail or bucket, with two heads to it. These heads have each a round hole in the middle, near four inches diameter, and covered with valves opening upwards; and that they might both open and shut together, there is a small iron rod fixed to the upper part of the lower valve, and at the other end to the under part of the upper valve; so that as the bucket

## G A L

descends with its sinking weight into the sea, both the valves open by the force of the water, which by that means has a free passage through the bucket. But when the bucket is drawn up, then both the valves shut by the force of the water at the upper part of the bucket; so that the bucket is brought up full of the lowest seawater to which it had descended.

When the bucket is drawn up, the mercurial thermometer, fixed in it, is examined; but great care must be taken to observe the degree at which the mercury stands, before the lower part of the thermometer is taken out of the water in the bucket, else it would be altered by the different temperature of the air. In order to keep the bucket in a right position, there are 4 cords fixed to it, reaching about 4 feet below it, to which the sinking weight is fixed.

**Water-GAGE**. See **HYDROMETER**.

**GAIANITES**, *Gaianitæ*, in church history, a branch of Eutychians. See the article **EUTYCHIAN**S.

**GAIN**, the profit or lucre, a person reaps from his trade, employment or industry. There are legal and reputable gains, as well as sordid and infamous ones. What is gained by gaming, is all liable to be restored again, if the loser will take the benefit of the law.

**GAIN**, in architecture, the levelling shoulder of a joist or other timber. It is also used for the lapping of the end of the joints, &c. upon a trimmer or girder, and then the thickness of the shoulder is cut into the trimmer, also levelling upwards, that it may just receive the gain, and so the joist and trimmer lie even and level with the surface. This way of working is used in floors and hearths.

**GALACTOPHOROUS**, or *Lactiferous Ducts*, in anatomy, those canals or vessels that convey milk to the breasts, or rather to those little tubes or ducts which precede from the glandulous substance of the breasts, are concentrated in the nipples.

**GALACTOSIS**, the act whereby the chyle is converted into milk.

**GALANGALS**, *Galanga*, in pharmacy, medicinal roots imported from the E. Indies.

There are two roots described by authors, and kept in the shops under the name of Galangals, a greater and a smaller; of these however the smaller is by far the most esteemed, and is almost the only kind ever heard of in prescription. The less abound with a volatile, oily, aromack salt. The people of the E. Indies use them, when fresh, by way of spice for the seasoning many of their dishes. With us the lesser is esteemed an excellent stomachick, and is made an ingredient in almost all bitter infusions and tinctures: it has also the credit of being a great cephalick, cardiack, and uterine, but it is more rarely used in those intentions. It is greatly recommended in vertigoes, and especially when they proceed from crudities in the stomach. The greater galangals possess the same virtue with the other, but in a less degree.

**GALANTHUS**, the snow-drop, in botany, a bulbous rooted plant, whose flower consist of three oblong concave petals, which spread open and are equal; the nectarium is obtuse, cylindrical, and indented; the stamina are six short filaments, topped with oblong acuminate antheræ, inclining together; and the fruit is an oval capsule obtusely trigonal, with three cells, which are filled with a number of roundish seeds. The snow-drop being one of the first flowers which blow in the spring, deserves a place in every garden.

**GALAXY**, *Via Lactea* or *Milk Way*, in astronomy, that luminous tract, which encompasses the heavens like



like a girdle, and is easily distinguishable in a clear frosty night, when the moon does not appear.

The galaxy passes between Sagittarius and Gemini, dividing the spheres into two parts; but unequally broad. It is in the region of the fixed stars, and not a meteor according to Aristotle; and, since the invention of the telescope, has been found to be no other than an assemblage of an infinite number of little stars, which are so remote that the naked eye cannot discern them. The like is observed in those other spots, called nebulae stars, which by the telescope are distinctly perceived to be clusters of little stars, too faint to affect the naked eye.

**GALBANUM**, in pharmacy, a gum issuing from the stem of an umbelliferous plant, growing in Persia and many parts of Africa. It is sometimes met with in the shops in loose granules, called drops or tears, and sometimes, in large masses, formed of a number of these blended together; but in these masses some accidental foulness is often mixed with the gum. The single drops usually approach to a roundish, oblong, pear-like form. Galbanum is soft like wax, and, when fresh drawn, white; but it afterwards becomes yellowish or redish: it is of a strong smell, of an acrid and bitterish taste: it is inflammable in the manner of a resin, and soluble in water like a gum.

It attenuates and dissolves tough phlegm, and is therefore of service in asthmas and inveterate coughs: it is also of great service in hysterick complaints; it dissipates flatulencies, promotes the menses, and facilitates delivery and the expulsion of the secundines. It is given in pills and electuaries, and is used externally in form of a plaister applied to the belly, against habitual hysterick complaints, and on many other occasions.

**GALENICK**, or **GALENICAL**, in pharmacy, a manner of treating diseases founded on the principles of Galen.

**GALENISTS**, such physicians as adopt the method of Galen. The late improvements in philosophy have reformed the Galenical method of physick, it becoming now all mechanical and corpuscular, by reducing every thing to the great principle of attraction, and the figure, bulk, &c. of the component particles of bodies.

**GALENISTS**, in church history, a branch of anabaptists, who are said to have adopted several Arian opinions concerning the divinity of our Saviour.

**GALLILEANS**, a sect of Jews. Their founder was one Judas, a native of Gallilee, from which they derived their name. Their chief, esteeming it an indignity for the Jews to pay tribute to strangers, raised up his countrymen against the edict of the emperor Augustus, which had ordered a taxation or enrollment of all the subjects of the Roman empire. They pretend that God alone should be owned as master and lord; and in other respects were of the opinion of the Pharisees: but as they judged it unlawful to pray for the infidel princes, they separated themselves from the rest of the Jews, and performed their sacrifices apart.

**GALL**, in the animal economy, the same with bile. See **BILE**.

**GALL-BLADDER**, called vesicula, and cystis fellea, is usually of the shape of a pear, and of the size of a small hen's egg. It is situated in the concave side of the liver, and lies upon the colon, part of which it tinges with its own colour. It is composed of four membranes, or coats; the common coat, a vesicular one, a muscular one (consisting of straight, oblique, and transverse fibres) and a nervous one, of a wrinkled or reticulated surface within, and furnished with an unctuous liquor.

The use of the gall-bladder is to collect the bile, first secreted in the liver, and mixing it with its own peculiar produce, to perfect it further, to retain it together a certain time, and then to expel it.

**GALL**, in natural history, denotes any protuberance or tumour produced by the puncture of insects on plants and trees of different kinds.

These galls are of various forms and sizes, and no less different with regard to their internal structure. Some have only one cavity, and others a number of small cells communicating with each other. Some of them are

as hard as the wood of the tree they grow on, whilst others are soft and spongy; the first being termed gall-nuts, and the latter berry-galls, or apple-galls. The general history of galls is this: an insect of the fly kind is instructed by nature to take care for the safety of her young, by lodging her eggs in a woody substance, where they will be defended from all injuries: she for this purpose wounds the leaves or tender branches of a tree; and the lacerated vessels, discharging their contents, soon form tumours about the holes thus made. The hole in each of these tumours, through which the fly has made its way, may for the most part be found; and when it is not, the maggot inhabitant or its remains are sure to be found within, on breaking the gall. However, it is to be observed, that in those galls which contain several cells, there may be insects found in some of them, though there be a hole by which the inhabitant of another cell has escaped.

Oak galls put, in a very small quantity, into a solution of vitriol in water, though but a very weak one, give it a purple or violet colour; which, as it grows stronger, becomes black; and on this property depends the art of making our writing ink, as also a great deal of those of dying and dressing leather, and other manufactures.

In medicine, galls are found to be very astringent, and good, under proper management, in diarrhoeas, dysenteries, and hæmorrhages of all kinds; they have also a very eminent virtue as a febrifuge.

**GALLERY**, a covered place in a house, that is longer than it is broad, which is commonly in the wings of an edifice, where persons may conveniently walk.

**GALLERY**, likewise signifies an isle or a little alley of communication between several rooms on a floor or in a line together.

**GALLERY**, in fortification, sometimes called traverse, is a little alley made of timber, in order to pass a fosse, the foundation being laid in the bottom thereof, and covered with planks whereon earth is laid, and placed at acute angles, the better to resist the fire of the enemy. The sides of the gallery are lined with iron plates, and are musket-proof. This contrivance serves to facilitate the miners reaching the bastion.

**GALLERY**, likewise signifies that passage of a mine under ground that reaches to the works designed to be blown up.

**GALLERY**, in a ship, a covered or uncovered balcony, abaft or in the stern, that communicates with the captain's cabin, for whose use and convenience it is principally intended in large trading vessels and ships of war.

**GALLEY**, a low built vessel, carrying between 25 and 30 benches of oars, and between 4 and 6 rowers to each oar. It carries some large cannon called coursier, and 4 more of a smaller size, 2 masts, and 2 square sails. A galley is usually about 22 fathoms long, 3 broad, and 1 deep. It goes with sails and oars, and generally close to land; though sometimes it crosses the seas.

**GALLIAMBICK VERSE**, in ancient poetry, signifies a verse consisting of 6 feet, viz. an anapest, or a spondee; an iambus, or an anapest, or a tribrach; an iambus; a dactyl; a dactyl; an anapest.

**GALLI**, in antiquity, the priests of the goddess Cybele. They were eunuchs, and took their name from Gallus, a river in Phrygia.

**GALLIUM**, ladies-bedstraw, in botany, a genus of plants, the flower of which is a quadrifid single petal, without any tube, and placed flatwise: the fruit consists of two globose bodies, growing close together, but not adhering, and containing each a single kidney-shaped seed. It is said to be an excellent astringent.

**GALLON**, a measure of capacity both for dry and liquid things, containing 4 quarts; but these quarts, and consequently the gallon itself, are different, according to the quality of the thing measured: for instance, the wine gallon contains 231 cubick inches, and holds 8 pounds averdupois of pure water: the beer and ale gallon contain 282 fold inches, and holds ten pounds 3 ounces and a quarter averdupois of water; and the gallon for corn, meal, &c. 272½ cubick inches, and holds 9 pounds 13 ounces of pure water.

**GALLY**,



**GALLY**, in printing, a frame into which the compositor empties the lines out of his composing-stick, and in which he ties up the page when it is completed. The gally is formed of an oblong square board, with a ledge on three sides, and a groove to admit a false bottom, called a gally-slice.

**GAMBOGE**, is a concreted vegetable juice, the produce of two trees, both called by the Indians caracapulli, and is partly of a gummy, and partly of a resinous nature. It is brought to us either in form of orbicular masses, or of cylindrical rolls of various sizes; and is of a dense, compact, and firm texture, and of a beautiful yellow. It is chiefly brought to us from Cambaja, in the E. Indies. It is used by painters in water colours, and sometimes in medicine.

**GAMES**, *Ludi*, in antiquity, were publick diversions, exhibited on solemn occasions. Such, among the Greeks, were the Olympick, Pythian, Isthmian, Nemæan, &c. games; and, among the Romans, the Apollinarian, Circensian, Capitoline, &c. games. See **OLYMPICK**, **PYTHIAN**, &c.

**GAMING**, the art or act of performing or practising any game, particularly a game of hazard, and this generally for stakes or a sum of money. See **CHANCE**.

**GAMUT**, in musick, a scale by which we are taught to sound the musical notes ut, re, mi, fa, sol, la. This was an improvement made on the diagramma of the ancients by Guido Aretin, a monk of Arezzo in Tuscany: the gamut was also called the harmonical hand, as he first made use of the figure of a hand to arrange his notes on.

Guido added 5 more notes to the ancient scale; one below the proslambanomenos, or gravest note; and four above the next or acute of the ancients. Guido's scale is divided into three columns, the first called molle, or flat; the second natural; and the third durum or sharp. The use of this scale is to make transitions from B flat to B sharp, by means of the tones and semi-tones.

M. le Maire has added a seventh note si; yet, the English usually throw out both si and ut, making the other five serve for, all.

**GANG-WAY**, in the sea language, is applied to the several passages from one part of the ship to the other.

**GANGLION**, in medicine, generally means no more than any hard moveable tumor, formed both on the internal and external surface of the carpus, most frequently near the tendons or ligaments of the muscles, but without any considerable pain. In recent ganglions, the inspissated matter is generally digested by careful frictions of the prominent part, rubbing it sufficiently every morning with fasting spittle, and applying over it a plate of lead, to be secured by proper bandages. But, should this method prove ineffectual, the ganglion is to be cut out with the knife, or extirpated by the proper corrosives, taking care not to injure the adjacent tendons or ligaments. Ganglion also denotes a knot or plexus frequently found in the course of the nerves, which is not morbid, as may be seen at the beginning of all the nerves of the medulla spinalis, &c.

**GANGRENE**, a very great and dangerous degree of inflammation, wherein the parts affected begin to corrupt, and put on a state of putrefaction. A gangrene is distinguished from a sphacelus, in as much as this latter is not an incipient but an absolute and perfect corruption, or death of the parts, already made. See **SPHACELUS**.

A gangrene may be discovered generally from the following signs; namely, the inflammation, with its symptoms, which have all along been very violent, do generally undergo a sudden change, as if they were going off. The parts which were before swelled and tense, do now grow soft and flaccid, and upon pressing with the finger on the skin and fat, its impression remains behind, as in an œdema; at length the cuticula separates from the cutis, often rising up in blisters, like those on burns, filled with a redish, yellowish, and black humour; and the sense of the limb is in some degree diminished.

The causes of a gangrene, as well as a sphacelus, are either external or internal. Among the internal causes are reckoned an erysipelas, and all other inflammations

which rise spontaneously, and can by no means be dispersed, nor brought to suppuration. Inflammations of this kind usually proceed from the blood's being too acrimonious, or corrupted by the bile, or in a scorbutus; or when the circulation of the blood is too quick, or too slow, by reason of old age, or any other weakness; or, lastly, when the patient uses a perverse course of life with respect to diet, and passions of the mind, especially anger, grief and fear, during the time of the inflammation. By external causes are intended injuries of the air, cold water, and the application of topical remedies externally to the inflamed parts; which are either cooling, astringent, fat, oily, or the like; together with all great external hurts or accidents, which frequently happen to the body through falls, blows, &c. as in wounds, fractures, luxations, &c.

A gangrene is for the generality never without danger, because it easily changes into a sphacelus; or intire inortification, which never admits of cure but by taking off the dead parts. But a gangrene which is slight, incipient, and not spread far, but only affects the skin and fat, is not very difficult to cure, especially when it happens in a young and stout patient, in a mild and temperate season, and does little or no injury to the muscles and nerves: but the larger, more violent, and confirmed is the gangrene, and the faster it spreads, the more difficult it is generally to effect a cure, especially in an old or weak patient; or in an ill habit of body, from a dropsy, phthisis, or scorbutus: the weather also being too hot, or very cold, or the parts affected being near the thorax, or abdomen, may make the case more dangerous. Nor can this case be neglected without the utmost danger of life, or its suddenly turning into a sphacelus.

Therefore the gangrene must be treated so, that it may not terminate in a sphacelus. For which end, first of all, in plethorick and strong habits, the patient must be bled largely, and the operation repeated at discretion; but in weak habits, it should be omitted. The remainder of the treatment, according to Heister, will consist chiefly in observing the following directions. 1. To be careful in the beginning to prevent all violent external causes of inflammations, too strict a bandage in wounds and fractures, all foreign bodies which are stuck in the part, as thorns, splinters, &c. improper medicines externally applied, as ointment, oils, and plasters, with cooling and astringent things; all which should be removed as soon as possible. 2. The next observation respects chiefly the keeping up the patient's strength, especially in weak and old people. This may be best effected by ordering a diet which not only affords good juices, but is also well accommodated to the age, constitution, and other circumstances of the patient. In weak and old people, the most suitable diet will be soups, strengthening broths, &c. With respect to medicines, the most proper are the corroborants, usually termed cordials, as the spirits, essences, powders, and electuaries of that tribe; especially made up or mixed with confectioned alkerkes. It will be proper also, in this case, frequently to apply a sponge to the nose or carpal arteries, which has been dipped in hungary water; also to bind it to the temples. For patients who are of a more warm, sanguine, and bilious habit, soups and ptisans mixed with acid juice of citrons or lemons, will be very proper strengtheners; at the same time, not neglecting other medicines, which are proper to be used in fevers; but the peruvian bark is by many celebrated in this disorder beyond any other internal medicine. 3. The chief and last observation concerning the treatment of a gangrene, is chiefly to discharge the stagnating and corrupted blood from the parts affected as soon as possible, to prevent the neighbouring parts from being affected thereby.

The principal means to effect this are, 1. To make use of proper internal, strengthening medicines. 2. To make scarifications on the part affected, by numerous incisions lengthways, and of a sufficient depth, in order to discharge the stagnating and corrupted blood, and to make way for the ingress of the virtues of the discutient medicines which are applied externally. Lastly, 3. Discutient, stimulating, and balsamick fomentations and cataplasms



cataplasms which resist putrefaction, are to be carefully applied to the disordered part. The fomentation is to be applied hot, several times in a day, to the parts affected, by means of linen or woollen cloths; and to give a lasting warmth, we may apply a hot tile wrapped up in a thick cloth, or a hot bag of sand.

**GANTLET**, or **GAUNTLET**, in antiquity, a large kind of iron glove that covered the hand or arm of a cavalier, when armed cap-a-pied; the fingers were plated. Gauntlets were not introduced till about the 13th century, when the casque and these were always borne in the ancient processions. The gantlet was frequently thrown, like the glove, by way of challenge.

**GANTLET**, in surgery, a kind of bandage for the hand and fingers.

**GAOL**, a place of legal imprisonment.

**GAOL-Delivery**, a patent, in the nature of a letter from the king, appointing certain persons his justices to deliver the gaol of such a part of the prisoners therein. Justices of gaol-delivery are empowered by the common law to proceed upon indictments of felony, trespass, &c. and to order execution and reprieve. And they have not only power to discharge such prisoners, as upon their trials shall be acquitted; but also such against whom, upon proclamation made, no evidence appears to indict them: which justices of oyer and terminer, &c. cannot do.

**GARBE**, in heraldry a representation of a sheaf of corn, sometimes borne to denote summer or August, as a bunch of grapes does autumn.

**GARBLER**, of spices, an ancient officer in the city of London, who may enter any druggist's shops, &c. and view, garble, and cleanse the drugs: the refuse, dust, &c. severed from good spice, drugs, &c. is called garbles.

**GARBLING**, is the act of cleansing spice, drugs, &c. from the dross mixt with them.

**GARDEN**, a plot of ground that is inclosed, well cultivated, and furnished with variety of flowers, plants, herbs, and fruits; as also gravel-walks, grass-plots and winter-greens, properly intermixed. Gardens are distinguished into flower-gardens, which are for ornament and pleasure; and into fruit and kitchen gardens, both which are more for service. In a garden three things are to be regarded; the form, the soil, and the situation. As to the first, an oblong square is the most eligible. As to the soil, black, deep, and rich mould is best for plants; and sandy soil is good for flowers: but cold soils may be corrected by proper composts. As to the situation of a garden, a flat, or the side of a hill seems to be most commodious, particularly for the supply of water. See **EXPOSURE**.

A pleasure garden should have vistas, parterres, groves, compartments, arbours, labyrinths, fountains, cascades, canals, &c. In a fruit or kitchen garden, if the soil be a poor gravel or sand, the holes where trees are to be planted should be dug two feet deep, and filled with rotten horse or cow-dung, mixed with a rich mould; if marle or stiff clay, a compost of rubbish will be the best to mix with the dung and mould. When the trees are taken out of the nursery, the biggest roots should be shortened to about 6 inches, taking off all the small fibres, and the head pruned so as to have only two branches, and those not above 6 inches long. Wall-trees should be placed as far from the walls as possible, for the roots to spread: then filling up the hole with mould; cover the spot with straw, dung, &c. to secure the roots from frost, and from the summer sun by laying sand and pebble stones thereon. And it is observable, that those wall-trees thrive best that have gravel-walks running parallel thereto, which reflect the rays of the sun: and no tall trees ought to shade the south-east or south-west walls. For trees planted in borders, there is commonly a trench made by the wall-side two feet broad and as many deep, which is filled with dung and earth, and trodden half down. It is prudent to plant the trees shallow, and raise the earth about them.

**GARDENING**, or **HORTICULTURE**, the art of cultivating a garden properly. Great men in all ages have not thought gardening an employment unworthy of their attention.

M. Le Nostre was the first who brought gardening to some degree of perfection, particularly as to parterres,

bowling-greens, terraces, labyrinths, cascades, fountains, jet-d'eaus, &c. ornaments which do very much raise the natural beauty of gardening. That part of gardening relative to fruits and to kitchen herbs has been very much improved by M. de la Quintinie: nor have our own countrymen been wanting in this respect, as London, Wise, Bradley, Laurence, Mortimer, Miller, James, Hughes, Fairchild. Recluse has, by enlarging upon Quintinie's plan, taught us how to water a garden in form of falling rain.

M. Taccio, in 1699, published a treatise on gardening wherein he teaches the method of employing the reflection of the rays of the sun to good purpose.

In the time of Charles II. and William III. the taste extended little further than to small pieces of box-wood, finished parterres, and clipt greens, all which are now generally exploded by the present age, who justly prefer the more extended rural designs of gardens which approach the nearest to nature.

**GARGARISM**, in medicine, is sometimes taken, in a large sense, for every collution of the mouth; but, strictly speaking, it signifies a liquid medicine, appropriated to affections of the mouth, gums, fauces, larynx, and sometimes of the head, received into the mouth, and there used by way of collution, without deglutition.

**GARLAND**, among sailors, a sort of net used by the different messes of a ship of war to hang their provisions in, in the apartment where they eat and sleep.

**GARLICK**, *Allium*, in botany, a plant with a bulbous root, consisting of several membranes, and is of a whitish colour with a purplish cast; the leaves are oblong, and not fistulous as those of the onion, but in their general characters they agree, and therefore classed by Linnæus together. See **ONION**.

Garlick is proper to warm and stimulate the solids, and to dissolve the gross clammy fluids; whence it is good in cold constitutions and in moist asthmas, as well as all decluxions of the breast; it is likewise very diuretick, as appears by its smell in the urine, and upon that account is serviceable in dropsies, for it will sometimes cure it without any other medicine; but it should be avoided in all inflammatory dispositions and hot diseases.

**GARNET**, *Granatus*, in natural history, a very beautiful gem, of a red colour, with a tincture of blue. When pure and free from blemishes, it is little inferior, in appearance, to the oriental ruby, though only of a middle degree of hardness between the sapphire and common crystal. It is found of various sizes, from that of a pin's head to an inch in diameter.

Among our lapidaries and jewellers, genuine garnets are known by different names, according to their different degrees of colour. 1. The garnet, simply so called, is the finest and most valuable kind, being of a very deep blood-red, with a faint admixture of blue. 2. The rock-ruby, a name very improperly given to the garnet, when it is of a very strong but not deep red, and has a fairer cast of the blue: this is a very beautiful gem. 3. The forane or ferain garnet, that of a yet brighter red, approaching to the colour of native cinnabar, with a faint blue tinge. 4. The almandine, a garnet only a little paler than that called the rock-ruby.

Garnets are very properly distinguished into the oriental and occidental kinds, as being found in Europe as well as the E. Indies. The oriental ones are principally brought from Calicut, Cananor, and Cambay; and the European ones are common in Italy, Hungary, and Bohemia. Some authors have supposed the deeper-coloured garnet to be the same with the carbuncle of the ancients, from which it really differs; since, on receiving the sun's beams, it never gives so true a fire-colour as the carbuncle.

**GARNET**, among seamen, a sort of tackle, or complication of pulleys, fixed to the main-stay of a merchantship to hoist the cargo in and out at the time of lading and delivering her. Also a rope fixed to the lower corners or clues of the main-sail and fore-sail to draw them up the yard occasionally, and hence called clue-garnet.

**GARRISON**, in the art of war, a body of forces, disposed in a fortress, to defend it against the enemy, or to keep the inhabitants in subjection; or even to be subsisted during the winter season; hence, garrison and winter-



winter-quarters are sometimes used indifferently, for the same thing; and sometimes they denote different things. In the latter case, a garrison is a place wherein forces are maintained to secure it; and where they keep regular guard, as a frontier town, a citadel, castle, tower, &c. the garrison should always be stronger than the townsmen.

Winter-quarters signify a place where a number of forces are laid up in the winter season, without keeping the regular guard.

**GARRISON-TOWN**, a strong place in which troops are quartered, and do duty, for the security thereof, keeping strong guards at each port, and a main guard in the market-place.

**Order of the GARTER**, a military order of knighthood, the most noble and ancient of any lay-order in the world, instituted by king Edward III. This order consists of 26 knights-companions, generally princes and peers, whereof the king of England is the sovereign or chief. They are a college or corporation, having a great and little seal.

Their officers are a prelate, chancellor, register, king at arms, and usher of the black rod. They have also a dean with 12 cannons, and petty cannons, vergers, and 26 pensioners, or poor-knights. The prelate is the head. This office is vested in the bishop of Winchester, and has ever been so. Next to the prelate is the chancellor, which office is vested in the bishop of Salisbury, who keeps the seals, &c. The next is the register, who by his oath is to enter upon the registry, the scrutinies, elections, penalties, and other acts of the order, with all fidelity. The fourth officer is garter, and king at arms, being two distinct offices united in one person. Garter carries the rod and scepter at the feast of St. George, the protector of this order, when the sovereign is present. He notifies the elections of new knights, attends the solemnity of their installations, carries the garter to the foreign princes, &c. He is the principal officer within the college of arms, and chief of the heralds.

**GAS**, among chymists, a term made use of by Helmont, to signify, in general, spirit incapable of coagulation, such as proceeds from fermented wine.

**GASKET**, among sailors, a sort of platted cord fastened to the sail-yards of a ship, to furl or tie up the sail to the yard: it is used by wrapping it round the yard and sail, the latter of which is rolled up close to the former for that purpose.

**GASTRO-EPIPLOICK VEIN**, a vein that opens into the vena portæ. See the article **VEIN**.

**GASTRICK**, in general, something belonging to the stomach. See **STOMACH**.

**GASTRICK JUICE**, *Gastricus Succus*, among physicians, a thin, pellucid, spumish and saltish liquor, which continually distils from the glands of the stomach for the dilution of the food. See the article **FOOD**.

**GASTRICK VESSELS**, in anatomy, the arteries and veins of the stomach. See **ARTERY** and **VEIN**.

**GASTROCNEMIUS**, in anatomy, the name of two thick, pretty broad, and oblong muscles, which form a great part of what is called the calf of the leg. They are situated laterally with respect to each other under the poples. It is also the name of one of the extensor muscles of the foot.

**GASTROTOMY**, in surgery, the cutting open the abdomen and uterus, as in the Cæsarean section.

**GATE**, in architecture, a large door, leading or giving entrance into a city, town, castle, palace, or other considerable building: or a place giving passage to persons, horses, coaches or waggons, &c.

**Palet GATES**, such as are set up in fences for shutting up the passages into fields and other inclosures.

**GATE**, in the manage, the going or pace of a horse.

**GAVELET**, in law, an ancient and special cessavit used in Kent, where the custom of gavel-kind continues, by which the tenant, if he withdraws his rent and services due to the lord, forfeits his land and tenements.

**GAVELKIND**, a tenure or custom belonging to lands in the county of Kent, by which the lands of the father are, at his death, equally divided among all his sons; or the land of a deceased brother, in case he leaves

no issue, among all the brethren. This is by some called ancient socage-tenure; the custom came from our Saxon ancestors, among whom the inheritance of lands did not descend to the eldest, but to all the sons alike; and the reason why it was retained in Kent is, because the Kentish men were not conquered by the Normans in the time of William I.

The particular customs attending this tenure are, that the heir, at the age of 15, may give or sell his lands in gavelkind; and though the father is attainted of treason and felony, and suffers death, the son shall inherit. A wife shall be endowed of a moiety of the gavelkind-lands, of which her husband died seised, during her widowhood. Likewise a husband may be tenant by curtesy of half his wife's lands, without having any issue by her; but if he marries again, not having issue, he forfeits his tenancy.

**GAUGE**, or **GAGE**. See the article **GAGE**.

**GAUGE-POINT**, of a solid measure, the diameter of a circle; whose area is equal to the solid content of the same measure. Thus, the solidity of a wine gallon being 231 cubick inches, if you conceive a circle to contain so many inches, the diameter of it will be 17.15; and that will be the gauge-point of wine measure. And an ale gallon containing 282 cubick inches, by the same rule, the gauge-point for ale-measure will be found to be 19.15. After the same manner may the gauge-point of any foreign measure be obtained; and from hence may be drawn this consequence, that when the diameter of a cylinder, in inches, is equal to the gauge-point of any measure, given likewise in inches, every inch in length thereof will contain an integer of the same measure, e. g. in a cylinder whose diameter is 17.15 inches, every inch in height contains one entire gallon in wine measure; and in another, whose diameter is 18.95 inches, every inch in length contains one ale gallon.

**GAUGER**, a king's officer who is appointed to examine all tuns, pipes, hogheads, and barrels of wine, beer, ale, oil, honey, &c. and give them a mark of allowance, before they are sold in any place within the extent of his office.

**GAUGING**, the art of measuring the contents of all kinds of vessels, thereby to determine the quantity of liquids, &c. they contain.

Gauging is a branch of stereometry. The principal vessels that come under its operation are pipes, barrels, rundlets, and other casks; also coolers, fats, backs, stills, &c. The solid content of cubical, parallelopipedal, and prismatical vessels is found in cubick inches, &c. by multiplying the area of the base by the perpendicular altitude. And the area of cylindrical vessels is found by multiplying the area of the circular base by the perpendicular altitude. Before the content of a cask can be known, its form or shape must be considered; for though the diameters and length of one cask may be equal to those of another, yet one of them may contain several gallons more than the other; and therefore the content of all casks cannot be found by the same rule. Most writers, therefore, in treating of this subject, have taken it for granted, that every common cask is in one of the following solids, viz.

1. The middle frustum of a spheroid.
2. The middle frustum of a parabolical spindle.
3. The middle frustum of two parabolical conoids abutting upon one common base.
4. The middle frustum of two cones abutting upon one common base. Accordingly, they have laid down rules for finding the contents of these solids, and by those rules they suppose the content of any cask may be found. But as it is very difficult to determine the variety to which any cask belongs, many gaugers are persuaded that the best method is to reduce the proposed cask to a cylinder; and which is done in the following manner: To the square of the bung diameter, add the square of the head diameter, and four times the square of the mean diameter; multiply this sum by the length of the cask, and divide by 2154.3 for ale, and by 1764.71 for wine; the quotients will give the contents respectively.

**GAUGING-Rule**, is an instrument commonly made of box, and sometimes ivory, exactly a foot long, 1 inch and 2-fifths broad, and  $\frac{3}{4}$  of an inch thick; it consists



of 4 parts, viz. a rule and 3 small scales or sliding-pieces fitted nicely with grooves to slide in it.

*Four-Foot GAUGING-Rod*, a rod, usually made of box-wood, and consists of four rules, each a foot long, and about half an inch square, joined together by three brass joints, by which means the rod is rendered four feet long, when the four rules are quite opened, and but one foot in length when they are folded together. On the first face of this rod is placed a line of inches (and sometimes with it a line of ale areas) decimally divided, whose use is to take dimensions necessary for gauging vessels either for ale, wine, malt, &c. Two diagonal lines are placed near the line of inches, one for ale, the other for wine.

The diagonal line of a cask is found by putting the rod in at the bung to the intersection of the head of the vessel, with the staves opposite to the bung-hole. By the bung, head, and length of a cask, we can find its diagonal line; whence, by having the contents of two similar casks, and the diagonal of one of them given, we can find the diagonal line of the other; for as the content of any cask, in ale or wine gallons, is to the cube of its diagonal, so is the content of any other cask (similar to the former) to the cube of its diagonal, whose cube root is the diagonal required.

Lines adapted to the London casks are placed on the other faces of four-foot gauging-rods, viz. 1. a line for a butt standing; 2. for a butt lying, each of which contains 108 gallons, beer-measure. 3. A line for a hoghead, containing 54 gallons. 4. A line for the barrel of 36 gallons. 5. A line for a kilderkin of 18 gallons. 6. A line for a firkin of nine gallons. Then, to gauge any of these casks, there is no more to do than to put in your rod perpendicular at the bung, &c. and if the cask is not full it gives you the quantity of liquor in the cask. For the same purpose there are also lines put on four-foot gauging-rods for wine measure; as, 1. A tun of 252 gallons. 2. A butt of 126 gallons. 3. A puncheon of 84 gallons. 4. A hoghead of 63 gallons. 5. A tierce of 42 gallons. 6. A barrel of  $31\frac{1}{2}$  gallons. 7. A rundlet of 18 gallons. And, lastly, an anchor of 10 gallons. By these lines all brandies and oils are gauged.

*GAWSE*, or *GAWZE*, in commerce, a very slight, thin, open kind of stuff, made of silk, and sometimes of thread; there are also figured gawzes, and some with gold or silver flowers on a silk ground.

*GAZONS*, in fortification, pieces of fresh earth, covered with grass, and cut in form of a wedge, about a foot long and half a foot thick, to line the outsides of works made of earth, as ramparts, parapets, &c. The first bed of gazons is fixed with pegs of wood; the second bed should be so laid as to bind the former, by being placed over its joints; and so continued till the works are finished. Betwixt these beds it is usual to sow all sorts of binding herbs, in order to strengthen the rampart.

*GEERS*, in country affairs, the trappings and other harness belonging to draught-horses or oxen.

*GELATINOUS*, in pharmacy and medicine, any thing approaching to the glutinous consistence of a gelatina, or jelly.

*GELD*, in our old customs, a Saxon word signifying money, or tribute: also a compensation for some crime committed.

*GELDING*, the operation of castrating any animal. It also particularly denotes a horse thus mutilated. In this operation regard is to be had to the horse's age and the season of the year. As to his age, he may be geld between 10 and 15 days old, if the testes be come down; for, the sooner it is done, the better for his growth, shape, and heart; though the operation may be performed at any age, by taking proper care. As to the second circumstance, the best time is April or May, or the end of September. And for the third, the wane of the moon is the fittest time for performing this operation.

*GELOSCOPY*, a kind of divination performed by means of laughter; or a method of knowing the qualities and character of a person by considering his laughing. This is a branch of physiognomy.

*GEM*, *GEMM*, *Gemma*, the common appellation

given to precious stones or jewels; the chief of these are the diamond, ruby, sapphire, emerald, turquoise, opal, achate or agate, pearl, crystal, &c. See each under its proper article.

*The Manner of imitating natural GEMS in Glass*. The art of imitating gems in glass, is too considerable to be passed without notice; some of the leading compositions therein we shall briefly mention, upon the authority of Neri. These gems are made of pastes, and are no way inferior to the native stones, when carefully made and well polished, in brightness of transference, but want their hardness. See *PASTE*.

The general rules to be observed in making the pastes are these: 1. That all the vessels in which they are made be firmly luted, and the lute left to dry before they are put into the fire. 2. That such vessels be chosen for the work as will bear the fire well. 3. That the powders be prepared on a porphyry stone, not in a metal mortar, which would communicate a tinge to them. 4. That the just proportion in the quantity of the several ingredients be nicely observed. 5. That the materials be all well mixed, and if not sufficiently baked the first time, to be committed to the fire again, without breaking the pot: for if this be not observed, they will be full of blisters and air-bladders. 6. That a small vacuity be always left at the top of the pot, to give room to the swelling of the ingredients.

To make paste of extreme hardness, and capable of all the colours of the gems, with great lustre and beauty; take of prepared crystal, 10 pounds; salt of pulverine, 6 pounds; sulphur of lead, 2 pounds; mix all these well together into a fine powder; make the whole, with common water, into a hard paste; and make this paste into small cakes of about 3 ounces weight each, with a hole made in their middle; dry them in the sun, and afterwards calcine them in the straightest part of a potter's furnace. After this, powder them, and levigate them to a perfect fineness on a porphyry stone, and set this powder in pots in a glass furnace to purify for three days: then cast the whole into the water, and afterwards return it into the furnace, where let it stand 15 days, in which time all foulness and blisters will disappear, and the paste will greatly resemble the natural jewels. To give this the colour of the emerald, add to it brass thrice calcined; for a sea-green, brass simply calcined to a redness; for a sapphire, add zaffer, with manganese; and for a topaz, manganese and tartar. All the gems are thus imitated in this by the same way of working as the making of coloured glasses; and this is so hard, that they very much approach the natural gems.

The colour of all the counterfeit gems, made of the several pastes, may be made deeper or lighter, according to the work for which the stones are designed; and it is a necessary general rule, that small stones for rings, &c. require a deeper colour, and the large ones a paler. Besides the colours made from manganese, verdigrise and zaffer, which are the ingredients commonly used, there are other very fine ones which care and skill may prepare. Very fine red may be made from gold, and one not much inferior to that from iron; a very fine green from brass or copper; a sky-colour from silver; and a much finer one, from the granates of Bohemia.

*GEMARA*, in Jewish antiquity, a collection of decisions and determinations on the law, wrote after the Mishna was completed.

*GEMELLES*, in heraldry, a bearing of bars by pairs in a coat of armour.

*GEMELLI*, *Gemini*, in anatomy, two small flat narrow muscles so called, situated almost transversely one above the other, between the tuberosity of the ischium and the great trochanter, immediately below the pyramiformis, and parted by the tendon of the obturator internus. The one is called the superior gemellus, which is the smallest, and the other the inferior.

*GEMINI*, *the Twins*, in astronomy, one of the constellations of the zodiack, represented by two beautiful children, embracing and looking very affectionately in the face of each other, and is thus marked in books,  $\pi$ . See *Plate IV. fig. 3*.

The poets say they represent Castor and Pollux, sons to Jupiter and Leda.

The



The stars of Gemini in Ptolemy's catalogue contain 24; in Tycho's 29; in the Britannick catalogue 89.

GEMMA. See the article GEM.

*Sal* GEMMÆ, particularly denotes rock salt; it is called gemma, on account of its brilliancy, resembling that of crystal. The chief mines of this salt are those of Wilisca in Poland, Eperie in Upper Hungary, and Cardonna in Catalonia. Its use is chiefly for pickling, where there are no salt springs, &c.

GEMMA, GEM, or EYE, in botany, is the bud of any tree, when beginning to bear.

GEMONII *Scala*, or *Gradus* GEMONII, in antiquity, were among the Romans a place of execution much like our gibbet or gallows. They stood in the 10th region of the city near the temple of Juno, Camillus having appropriated the place to this use in the year of Rome 358.

GENDARMES, or GENDARMERIE, a select body of horse-guards belonging to the French king's household troops; they consist of about two hundred and fifty gentlemen; the king is their captain, and some prime peer captain-lieutenant. Besides these there are the Scotch, English, Burgundy, and Flemish Gendarmes, which compose the king's life-guard. Each troop at a medium consists of 76 light horse. The other companies take their names from the princes that command them as captains.

GENDER, in grammar, a division of nouns, which originally was intended to distinguish the two sexes; but this was afterwards extended to other words that had no relation to either sex, and is at length established by custom. So that genders vary according to the languages, or even according to the words introduced from one language into another. Nay, a gender has sometimes changed in the same language.

In English there are no genders, only we express the difference of sex by different words, as boar, sow, &c. We have also 24 feminines distinguished from the males by changing the termination into *ess*, as poet, poetess, prince, princess, &c. The eastern languages and the vulgar languages of the west have only the masculine and feminine genders. The Greek and Latin have, besides, the neuter, common or doubtful genders: this last properly belongs only to the names of some animals, which are promiscuously joined both to masculine and feminine adjectives, as *bos*, *canis*, &c. to express either the male or female. There is also the epicene gender, which serves promiscuously for either sex; as *vulpes*, a fox, though it signifies either the male or female, is of the feminine gender; and *custodiæ*, watchmen, are feminine, though they signify men. The Latin and Greek in the neuter gender do not regard them, having no relation to the male or female, but what fancy and the termination of particular words give them. The oriental languages frequently neglect the use of genders, and the Persian language has none at all.

GENDER, in geometry, is applied to the classes and orders of geometrical lines which are distinguished according to the number of the dimensions of the equation that expresses the ratio of their ordinates or abscissas.

GENEALOGY, a series of ancestors, or a summary account of the relations and alliances of a person or family, in the direct and collateral lines.

GENERAL, something that extends to a whole genus, as a general rule, a general loss, &c.

GENERAL, in military affairs, is an officer, who not only commands a single company, or regiment, but whose authority extends over several regiments of horse and foot; as lieutenant-general, major-general, a general of the horse or foot, brigadier-general, paymaster-general, commissary-general, surgeon-general, muster-master-general, &c.

GENERAL *Terms*, in logick, are such as express general ideas; and ideas become general by separating from the circumstances of time, place, or any other mode of existence: by this way of abstraction they become capable of representing more individuals than one, each of which having a conformity to that abstract idea, is of that particular sort.

GENERAL, also denotes the chief of a religious or

der, or of all the fraternities established under the same rule.

GENERAL, in war, signifies a particular beat of drum.

GENERALISSIMO, *Captain-General*, or simply *General of any Army*, is an officer who commands all the military forces of a nation, who gives orders to all the other general officers, and receives none himself but from the king. Balzac tells us that Cardinal Richelieu was the first who coined this word by his own absolute authority, when he went to command the French army in Italy.

GENERATING LINE or FIGURE, in geometry, is that which by its motion produces any other figure, plane or solid.

GENERATION, in physics, the art of producing any thing, or the changes of a body into a new one, which retains no sensible mark of its former state. In generation there is not properly any production of new parts, but only a new modification or manner of existence of the old ones; by which generation is distinguished from creation.

GENERATION of *Animals*, is a mysterious process in the œconomy of nature; the parts concurring hereto being very numerous, and their functions chiefly performed in secret. There are, however, 4 systems relating to this mysterious performance of nature, given us by Aristotle, Harvey, Leewenhoke, Buffon, and Maupertuis.

According to Aristotle, the males contain the principle, and the females the matter of generation: for though both were furnished, indeed, with a seminal liquor, yet the semen of the males alone was prolific. The moderns, on the other hand, as well those who contend for the system of generation from eggs, as they who adopt that of the animalcules in the male seed, pretend that females have no such seminal liquor at all, and that what was commonly taken for it was some other animal fluid. There are great and many difficulties which attend the most plausible account of the first formation of the parts of an animal, and the beginning of motion in its fluids: for though both reason and experience convince us, that all the parts of an animal did exist before generation, yet, how this matter comes to assume so very different a form, as that of an embryo, is by no means agreed on.

Harvey is of opinion, that all females are furnished with eggs, and that the embryos, or young animals, are formed in the same manner as a chick in the egg of any bird. Generation, according to this celebrated physician, is effected only by means of the uterus, or womb, which conceives the foetus by a kind of contagion communicated to it by the male seed, much in the same way as a load-stone communicates magnetism to iron. This contagion, he thinks, acts not only on the uterus; but is communicated to the whole body of the female, which is altogether prolific; though the uterus he acknowledges is the only part that is capable of conceiving the foetus, just as the brain is alone capable of forming ideas and notions. Agreeably to this doctrine of Harvey, Steno, and other anatomists, have pretended to discover certain eggs in the ovaries or testicles of women; which Mr. Buffon denies to be the case, affirming, that there are no such eggs to be found in the testicles or ovaries of women.

We cannot enter into a detail of the reasonings for and against the system of generation from eggs, and shall therefore only observe, that its advocates pretend to have discovered eggs in all the females on which they made observations; that the largest of those found in women did not exceed the bigness of a pea; that they are extremely small in young girls under fourteen, but that age and commerce with men makes them grow larger; that there are more than 20 such eggs in each ovary or testicle; that they are fecundated in the ovary by the spirituous and volatile part of the male seed; that they afterwards are detached and fall into the uterus through the Fallopian tubes; that here the foetus is formed of the internal substance of the egg, and the placenta of the exterior part.

Leewenhoke is the author of another system of generation,



neration, from animalcules in the male seed. He tells us, he discovered many thousand of these in a drop less than a grain of sand. These are found in the semen of all males whatever, but not in that of females; and are so small, that 3,000,000,000 of them are not equal to a grain of sand, whose diameter is but the hundredth part of an inch. When any of these animalcules gets into an egg, fit to receive it, and this falls into the womb through the Fallopian tubes, the humours which distil through the vessels of the womb, penetrating the coats of the egg, swell and dilate it as the sap of the earth does seed thrown into it. The placenta begins to appear like a little cloud, upon one side of the external coat of the egg; and, at the same time, the spine of the embryo-animalcule is grown so big, as to become visible; and a little afterwards, the cerebrum and cerebellum appear like two bladders; and the eyes stand next goggling out of the head; then the beating of the heart or punctum saliens, is plainly to be seen; and the extremities discover themselves last of all.

The animalcules are of different figures, some like tadpoles, and others like eels. In the semen of a man, and in that of a dog, there have been discovered two different kinds of them, the one supposed to be males, and the other females. Some even pretend to have seen animalcules disengage themselves from the membranes that surround them; and that they then appeared perfectly like men, with legs, arms, &c. like those of the human body.

All the advocates for the system of generation from animalcules strongly oppose that from eggs. They contend, that these animalcules cannot be looked upon as the inhabitants of the semen, since they were of greater extent than the liquor itself, not to mention that no such animals are found in any other liquors of the body; and since females have nothing similar to these animals, they think it manifest that the prolific principle resides in the males. When they are asked, to what purpose serves such an immense profusion of human animalcules, they answer, that it is agreeable to the ordinary course of nature, both in the animal and vegetable part of the creation. They likewise strengthen their system, by alledging the many examples we have of similar transformations in the insect-class of animals, which from caterpillars and small worms, become winged animals of the butterfly, or fly kinds.

By this system, says Mr. Buffon, the first woman cannot be said to have contained the whole race of mankind, as being all, according to it, the true posterity of the first man, and in their animalcule state contained only in him. On this principle he proceeds to invalidate the system of generation from animalcules : for supposing the size of a man to be 1, then will that of one of the spermatick animalcules be  $\frac{1}{1000000}$ ; and as a man is to an animalcule of the first generation in the same ratio, that this animalcule is to an animalcule of the second generation, it follows that this will be expressed by the fraction  $\frac{1}{1000000^2}$ . In this manner he computes the size of the animalcules of several generations, all supposed to be living animals, notwithstanding that their minuteness exceeds the power of imagination to conceive; and then tells us, that the system of generation from eggs is liable to the same objections, whereof the detail may be seen in his *Hist. Natur.* tom. 2. p. 157. & seq.

As to Buffon's own system, he thinks that every part, both of animals and vegetables, contain an infinite number of organick molecules; that these molecules assume successively different forms, and are put into different motions, according to the circumstances they are in; but that they are much more numerous in the feminal liquors of both sexes, and the seeds of plants, than in other parts; that these organick molecules make the matter of nutrition; that this matter is always active, and tends to organization, forming itself into different shapes, according to the moulds it meets with. When the quantity of this organick matter is but small, as in man, and most large animals, generation only takes place at the age of maturity, and even then the number of animals produced is but small.

The case is just the reverse in animals which abound with this matter, as in fishes, and most birds.

With respect to the generation of mankind, the same author thinks it a certain fact, that the male-feed is received into the womb of the woman; and that, for this purpose, it is highly probable the internal orifice opens during the act of coition. The female-feed also makes its way into the womb, where being mixed with that of the male, they both together contribute to the formation of the foetus; which is either male or female, according as the feed of the man or woman abounds most with organick molecules; and the infant resembles either the father or mother, according to the different combination of these molecules. Both these seminal liquors he thinks equally active in the formation of the foetus, and that they fix and counterbalance each other; the molecules of each parent being thereby determined to form similar parts to those of the individual that furnished them, as the head, trunk, arms, legs, &c. He thinks the molecules proceeding from the genital parts fix themselves first; and that the other molecules arrange themselves successively round these, in the same order which they before occupied in the parent. When a great quantity of the seminal liquors of both sexes is received into the womb, there are formed different spheres of attraction in different parts of these liquors; the consequence of which is, that several foetuses are formed at the same time. See VEGETATION.

Nearly similar to Mr. Buffon's system is that of Mr. Maupertuis, which he has explained in his *Venus Physique*. He observes, that all the variety observable among mankind, may have been accidental at first; but being once established in the constitution of the parents, they become natural to their posterity. To illustrate this, he gives an instance of a sexdigitary family at Berlin, who had six fingers, or six toes, and frequently both; and that this peculiarity was transmitted equally by the father and mother, but was lost by alliances with those who had but the usual number of fingers or toes.

He further observes that most animals, excepting mankind, have stated seasons for procreation, and that the females go with young some a longer, others a shorter time. Mares go from 11 to 12 months; cows and hinds go 9 months; and bitches go only 7 weeks; cats 9 weeks; and rabbits but 31 days. Most birds are hatched in 21 days; the canary birds, and some others, are hatched in 13 or 14 days. It appears, therefore, that there is an endless variety in the time and manner of the generation of animals. Those who desire a more full account of these systems of generation may consult Harvey, Leewenhoke, Buffon, &c.

*Parts of GENERATION.* The parts of generation, in men, are the testicles, vasa deferentia, vesiculæ seminales, and penis. Those, in women, are the pudendum or vulva, the clitoris, nymphæ, vagina, uterus or womb, ovaries, and Fallopian tubes.

GENERATION of *Fishes*. The opinion of most naturalists, that the female fishes first deposit their spawn, and that the males afterwards eject the semen upon it, is denied by Linnæus, who thinks it impossible that the eggs of any animal should be impregnated out of its body. He thinks it much more probable, that the males always eject their semen some time before the females deposit their spawn; and that, by swallowing this semen, the spawn is impregnated in the body of the fish. Nay, he tells us, that he himself saw three or four females, in spawning time, gather about the male, and greedily swallow the semen he ejected. This he observed in some species of the esox, perch, and especially the cyprinus; but he recommends further enquiry to be made on this subject.

GENERATION of *Insects* is now certainly known to be from eggs; which the female deposits in places, where, at a proper season, they are hatched into animals like their parents; or into maggots, or worms, which, after several transformations, at last appear in the form of their parents.

GENERATION of Plants. It is in the flowers of vegetables only, that the parts subservient to generation are



are produced : and these flowers are either male, female, or hermaphrodite. Male flowers are those possessed of the organs of generation, analagous to the male parts of animals ; such are the stamina and apices, called by Linnæus, filaments and antheræ. The female flowers are only endowed with parts like those which perform the office of generation in females ; and these are the pistil and its appurtenances, which Linnæus divides into three parts, the germen, style, and stigma. The hermaphrodite-flower, which constitutes the great bulk of the vegetable creation, is possessed of all these parts in itself, and is therefore capable of propagating its species without any foreign assistance ; which, by many incontestible experiments, it has been found neither the male nor female flower simply is able to do. The impregnation of hermaphrodite flowers may be performed within their own calyx ; but before a separate female flower can be so, the farina fecundans of the male flower must necessarily be conveyed to it through the circumambient air ; which is the reason why the quantity of the produce of such plants is much more precarious than that of plants which have hermaphrodite flowers : for if during the flowering of these separate male and female plants, the weather proves either very wet or stormy, their produce of fruit will be very considerable, from the spoiling or hasty dissipation of the male farina. Thus, independent of frosts, the fruit of the nut and filbert-tree will be most numerous in those years, in which the months of January and February are the least stormy and wet, because at that time their flowers are produced. For the same reasons, a stormy or wet May destroys the chestnuts ; and the same weather, in July, prodigiously lessens the crop of maize, or Indian corn, as its spikes of male-flowers stand lofty, and at a considerable distance from the female.

Some of the more skilful modern gardeners put in practice, with regard to melons and cucumbers, the very method mentioned by Theophrastus two thousand years ago, in regard to the palm-tree. As these plants, early in the season, are in the climate confined to frames and glasses, the air in which they grow is more stagnant than the open air ; whereby the distribution of the farina fecundans, so necessary towards the production of the fruit for the propagation of the species, is much hindered. To obviate the inconvenience thence arising, they collect the male flowers when fully blown ; and presenting them to the female ones by a stroke of the finger, they scatter the farina fecundans therein, which prevents the falling of the fruit before it is ripe.

By far the greater part of plants produce hermaphrodite flowers : but some there are which have separate male and female flowers growing from the same roots, as maize, nettles, box, elm, birch, oak, beech, hazel, horn-beam, plane-tree, pine, fir, cypress, cedar, melons, cucumbers, gourds, and several others ; in many of these, the male and female flowers stand at a considerable distance. There are other plants which produce those necessary organs upon different roots, as the palm-tree, hops, the willow-tree, mistletoe, spinach, hemp, poplar, French and dog's mercury, the yew-tree, juniper, and several others. Among these, the valisneria of Linnæus, as to the manner in which its male-flower impregnates the female, is one of the most singular prodigies in nature. It grows in rivulets, ditches and ponds, in many parts of Europe. The male plant, which is continually covered with water, has a short stalk, upon the top of which its flowers are produced. As this top never reaches the surface of the water, the flowers are thrown off from it, and come unopened to the surface of the water, where, as soon as they arrive, by the action of the air, they expand themselves, and swim round the female flowers, which are blown at the same time. These last have a long spiral foot-stalk, by which they attain the surface of the water, and remaining there in flower a few days, are impregnated by the male-flowers detached from the stalk at the bottom.

It is observable, that the operations of nature are carried on most usually by certain general laws, from which however she sometimes deviates. Thus almost all plants have either hermaphrodite flowers, growing from the same root, or male and female flowers growing from

different roots ; but there are a few of another class, which, from the same root, furnish either male and hermaphrodite flowers or female and hermaphrodite ones : of this kind are the mulberry-tree, white hellebore, the musa or plantane-tree, pellitory, arrack, the ash-tree, and a few others.

GENERATION is also applied to a people or nation ; and sometimes to the ordinary period of a man's life.

GENESIS, in geometry, the formation of a line, plane or solid, by the motion of a point, line or surface. The genesis of a sphere may be conceived by supposing a semicircle to revolve upon a right line drawn from one extremity thereof to the other, called its axis of circumvolution. In this genesis, the line or surface that moves is called the describent, and the line round which this motion is made, the dirigent.

GENESIS also denotes the first book of the pentateuch, containing the history of the creation, and the lives of the first patriarchs.

GENET, or JENNET, in the menage, a small-sized, well-shaped Spanish horse. Riding a la genet, is riding in the Spanish mode, that is, with stirrups so short, that the spurs bear upon the horse's flanks. This is deemed a piece of gallantry in Spain.

GENETHLIACI, in astrology, persons expert in the science of calculating nativities, or predicting the future events of life from the stars predominant at the birth. But Antipater and Achinapoli have shewn, that genethliology should rather be founded on the time of conception, than on that of the birth. The word is formed of the Greek γενεσθαι, origin, generation, nativity.

In Genethliacal Astrology, before judgment can be given upon any person's nativity, the true time of the native's birth should be had, at least, to be certain of the zodiacal sign that then ascended ; for should an artist give judgment from a false ascendant, it must necessarily be wrong. The difficulty, therefore, is, how to obtain the knowledge of the true ascendant, since it seldom happens, that the time of an infant's birth is truly observed, or known within the proper limits of 10 or 15 minutes. It is with a view to remedy this neglect, that several learned students in this science have given us divers rules, whereby the true time of birth may be obtained from the estimate time given provided it can be depended upon to be within an hour or two ; these rules are either, *Per Accidentia Nati*—or *Per Animæ Peritolemei*—or *Per Trutinam Hermetis*, &c. The first is most universally and very justly preferred ; as the most certain way ; but then it requires the native to have lived some years, and to have suffered some remarkable accident or accidents, before it can be put into practice, and therefore can be of no service in rectifying the nativities of infants ; whereas says the learned Sir Christopher Heydon, “ The rule which that most illustrious of ancient philosophers, Hermes Trismegistus teacheth by the moon's place in the nativity, to come to the true time of conception ; for her place in the nativity, was the true ascendant in the generation ; and her place in the conception, or the opposite, is the true ascendant, or opposite of the nativity ; which (as I can speak of my own experience in divers genitures, besides the confirmation of the learned ever since Hermes's time) is found true. Some, indeed, say, That they have sometimes failed in the practice of this rule, but then they do not consider the true rule, taking the degree of her true motion in the zodiack for her place, as in truth, her place considered with latitude, is truly understood in the rule, and the degree co-ascending therewith.” This easy and exact method for rectifying of nativities is trigonometrically and fully explained both by precept and practice in *Coley's Astrological Observations*, in his Ephemeris of 1736, 1737, 1738.

The judicious Mr. Dryden studied genethliacal astrology with great accuracy and success, as appears from the calculations of his children's nativities, and especially that of his son Charles ; concerning whom, from his geniture, he thus predicted ; “ If he [Charles] lives to arrive at the eighth year of his age, says Mr. Dryden, he will go near to die a violent death on his very birth day,



day; but if he should escape, of which I see but small hopes, he will in the 23d year be under another dangerous direction; and if he should escape that also, the 33d year will produce a killing direction." Before the month of august, in which young Dryden was to enter into the eighth year of his age, Mr. Dryden was invited to the country seat of the earl of B. his brother in law, at Charlton in Wilts; where, on the very day of Master Charles's anniversary, lord B. made a general hunting-match, to which all the neighbouring gentlemen were invited. Mr. Dryden accompanied the Gentlemen after taking care to set his son a double exercise in the Latin tongue, which he taught his children himself, with a strict charge not to stir out of the room till his return; well knowing the task he had left him would take up longer time. Charles was busy in performing his duty, in obedience to his father, when the stag made towards the house; and the noise alarming the servants, they hastened out to see the sport—One of them took young Dryden by the hand, and led him out to see it also, when, just as they came to the gate, the stag being at bay with the dogs, made a bold push, and leaped over the court-wall, which was low, and very old; and the dogs following, threw down part of the wall, ten yards in length, under which Charles Dryden lay buried.—He was immediately dug out, and after six weeks languishing in a dangerous way, he recovered. In the 23d year of his age he fell from the top of an old tower belonging the Vatican at Rome, occasioned by a swimming in his head, with which he was seized, the heat of the day being excessive.—He again recovered, but was ever after in a languishing sickly state. In the 33d year of his age, being returned to England, he was unhappily drowned at Windsor.—He had with another gentleman swam twice over the Thames; but in crossing it the third time, it was supposed he was taken with the cramp, because he called out for help, though too late. Thus were the father's predictions fulfilled, and his skill in genethliacal astrology verified.

**GENETHLIACUM**, or **GENETHLIACON**, a kind of birth-day ode, or song on the birth of some illustrious person; such is that of Virgil to Pollio, that begins, Sicelides musæ, paulo majora, &c. There were also genethliac orations. They predicted honours, &c. to the person himself and commemorated the signal virtues of his family and ancestors, &c.

**GENEVA**, vulgarly called **GIN**, a kind of compound spirit, which is so denominatèd, as being drawn partly from juniper-berries, &c. It is a liquor common in England, Holland, &c.

**GENIAL**, *Genialis*, among the ancients, denoted such gods as they supposed presided over generation. Among the genial deities were ranked the four elements, water, earth, fire, and air, as also the sun, moon, stars, &c.

**GENICULI**, in botany, the knots in some plants, and other parts, whereby they are divided into joints. Hence such plants are denominatèd geniculate.

**GENIOGLOSSI**, two partner muscles that lie immediately under the geniohyoidæus: they arise fleshy from the fore-part of the lower jaw internally, and, from thence enlarging themselves, are inserted in the root of the tongue. When these act, they pull the tongue forwards and thrust it out of the mouth.

**GENIOHYOIDÆUS**; this, with its partner, are short, thick, and fleshy muscles, arising from the internal parts of the lower jaw-bone or chin; and, from thence dilating, they are soon lessened, and inserted into the superior part of the fore-bone of the os hyoides. By these acting, the os hyoides is pulled both upwards and forwards, and they assist the genioglossi in thrusting the tongue out of the mouth.

**GENITALIS**, in medicine, any thing belonging to generation; the genitals, or genital parts, more particularly denote the parts in both sexes appropriated to generation.

**GENIL**. See **GENIUS**.

**GENITIVE**, in grammar, the second case of the declension of nouns, denoting the relation in which one thing is considered as belonging to another, as liber Jo-

hannis, the book of John. In English the genitive case is made by the particle of, without any difference of termination as in the learned languages. In the Hebrew tongue the noun governing undergoes the alteration which happens in the noun governed in the Greek and Latin.

**GENIUS**, a good or evil spirit, or dæmon, whom the ancients supposed placed over each person, to direct his birth, accompany him in his life, and to be his guard.

**GENIUS** is now more frequently used for the force or faculty of the soul, as it thinks or judges.

**GENIUS** is also used in a more restrained sense for a natural talent or disposition for one thing more than another.

**GENTIAN**, *Gentiana*, in botany, a genus of plants, the flower of which consists of a single petal, tubulated and imperforated at the base; and at the edge, divided into five segments, various in figure: the fruit is an oblong, cylindrick, acuminate capsule, slightly bifid at the top, formed of two valves, and containing only one cell: the seeds are numerous and small; the receptacles are two, and grow to the two valves of the capsule. The root of this plant is large, remarkably tough, and of a firm texture. It is brought to us from Germany, where it is in many places cultivated as liquorice is amongst us; and is to be chosen fresh, though, of a middle size, free from the small fibres, and well dried; though if it be scorched, it is to be rejected.

This root is one of the best stomachick-bitters that the materia medica affords: it procures an appetite, and greatly assists digestion. But if we give credit to some authors, this is one of the least of its virtues; they have recommended it as a febrifuge and an alexipharmick, and as the most certain remedy for the bite of a mad dog. On this occasion it is not only recommended internally but externally, a cataplasm made of venice-treacle and the powder of this root, being ordered to be applied to the wound. It is also said to be a certain remedy for agues, and one of the best known medicines against the plague.

**GENTILE**, in matters of religion, a pagan, or worshipper of false gods.

The origin of this word is deduced from the Jews, who called all those who were not of their nation, by the name of גוֹיִם, gojim, i. e. gentes, which in the Greek translations of the Old Testament, is rendered by ἔθνη; in which sense it frequently occurs in the New Testament, as in Matt. vi. 32. *All these things the nations or gentiles seek.* Whence the Latin church also used *gentes*, in the same sense as our gentiles, especially in the New Testament. But the word *gentes* soon got another signification, and no longer meant all such as were not Jews, but those only who were neither Jews nor Christians, but followed the superstitions of the Egyptians, Greeks, Romans, &c. In this sense it continued among the Christian writers, till their manner of speech, together with their religion, was publicly and by authority received in the empire, when gentiles from *gentes*, came into use: and then both words had two significations, viz. in treatises or laws concerning religion, they signified pagans, neither Jews nor Christians: and in civil affairs, they were used for all such as were not Romans.

**GENUS**, among metaphysicians and logicians, denotes a number of beings, which agree in certain general properties, common to them all: so that a genus is nothing else but an abstract idea, expressed by some general name or term. It is plain, therefore, that by a genus we do not barely signify one particular thing, nor yet a plurality of things; but a sort or kind of things, all agreeing in certain general properties. Thus animal is said to be a genus in respect of man and brute, in regard man and brute agree in the common nature and character of animal: so a right-lined figure of four sides, is a genus in respect of a parallelogram, and a trapezium; and so likewise is substance, in respect of substance extended, which is body: and thinking substance, which is mind.

**GENUS**, is also used for a character or manner applicable to every thing of a certain nature or condition: in which sense it serves to make capital divisions in divers sciences, as musick, rhetorick, anatomy, and natural history.

**GENUS**,



**GENUS**, in musick, by the ancients called *genus melodice*, is a certain manner of dividing and subdividing the principles of melody; that is, the consonant and dissonant intervals into their concinnous parts.

**GENUS**, in natural history, a sub-division of any class or order of natural beings, whether of the animal, vegetable, or mineral kingdoms, all agreeing in certain common characters.

**GEOCENTRICK**, in astronomy, is applied to a planet or its orbit, to denote it concentrick with the earth, or as having the earth for its centre, or the same centre with the earth. See **EARTH** and **PLANET**.

**GEOCENTRICK**, *Latitude of a Planet* is its distance from the ecliptick, as it is seen from the earth, which, even though the planet be in the same point of her orbit, is not constantly the same, but alters according to the position of the earth in respect to the planet. For let  $BAT$  (plate XXXVII. fig. 1.) be the orbit of the earth.  $PN$  the orbit of the planet, which suppose to be at  $P$ ; from which let fall on the plane of the ecliptick the perpendicular  $PE$ . In whatever part of her orbit the earth is, this line  $PE$  will always subtend the angle which measures the geocentrick latitude of the planet. Suppose, therefore, the earth at  $T$ , and Venus in  $P$ , where she comes nearest to the earth, in which position Venus is seen in her inferior conjunction with the sun, and her geocentrick latitude is measured by the angle  $PTE$ . But if Venus should be in the same situation,  $P$ , and the earth were at  $t$ , and from thence Venus were observed in her superior conjunction with the sun, where she is at her greatest distance from us, her geocentrick latitude would be answerable to  $PtE$ , which is much less than the angle  $PTE$ , because the distance  $Pt$  is greater than  $PT$ .

What we have here said of the latitude of Venus, is likewise true of that of Mercury, and upon the same account. See **HELIOCENTRICK** and **LATITUDE**.

**GEOCENTRICK** *Place of a Planet*, the place wherein it appears to us from the earth, supposing the eye there fixed: or it is a point in the ecliptick to which a planet seen from the earth is referred.

**GEODÆSIA**, the same with surveying. See **SURVEYING**.

**GEOGRAPHICAL MILE**, the same with the sea-mile; being one minute, or the sixtieth part of a degree of a great circle on the earth's surface. See **DEGREE**.

**GEOGRAPHY**, that part of mixed mathematics which displays the state of the earth and its parts.

This art has been cultivated from the most early times; and the method of representing the earth, or some particular region of it upon geographical maps, is very ancient. Anaximander, the disciple of Thales, above 500 years before Christ, had composed works of this kind.

The honour of reducing geography into a system, was reserved for Ptolemy, who, by adding mathematical reasoning to the historical method in which it had been treated before, has described the surface of the earth in a much more intelligent manner than any of his predecessors; he delineated it by more certain rules; and by fixing the bounds of places by longitude and latitude, has left us a certain method of correcting the mistakes and errors of others as well as his own\*.

Every one knows the essential relation geography bears to astronomy, which of late years has made such extraordinary progress: it is therefore no wonder the ancients, with all the genius and penetration we are willing to allow them, were not able to attain to the same degree of knowledge, as they were not assisted by the same helps. The moderns have opened a passage to

a new world, unknown to the ancients, and those parts of the old which they thought uninhabitable, have been found to be inhabited, and their torrid zone to be temperate enough, by refreshing showers, constant breezes, cold nights by the direct setting of the sun and interposition of the whole body of the earth. Antipodes which have been the subject of so much controversy, are now demonstrated to be matter of fact; and the globe itself has been compassed with less difficulty by Magellan, Drake, Anson, &c. than the Phœnicians and Greeks could have coasted the Mediterranean. However, there are yet parts enough undiscovered to check our vanity, which by a modest computation we may allow to be a fourth part of the terraqueous globe. There has been much controversy respecting the southern continent, which by the late voyage of captain Cooke seems more doubtful as to its existence than ever; but if such a continent does exist, it must be so near the southern pole as to render the discovery of it but of little use. The northern parts of America are yet undiscovered, nor is it determined, whether it is a vast island or continent. Though Africa has been compassed round from the Mediterranean to the Red Sea, yet little more than its coasts are thoroughly known, except Egypt and Abyssinia. Its inland parts have been either not sufficiently viewed, or but imperfectly described. And as to Asia, what a prodigious compass are we forced to fetch about to come at its extreme regions, most of which might be saved, could a passage be discovered by the north west to Tartary and China. A passage which has often been attempted, but always with disappointment, and sometimes with the loss of the adventurers.

There is one thing yet very imperfect in our geography, the fixing the true longitude of places; and though several new methods have been lately tried to redress this inconvenience, both from exact pendulums, and observations on the immersions and emersions of Jupiter's satellites, they have not yet proved entirely effectual.

**GEOMETRICAL**, a general epithet given to whatever belongs to, or is strictly connected with the science of geometry.

**GEOMETRICAL** *Construction of Equations*. See the article **CONSTRUCTION**.

**GEOMETRICAL** *Curve*, is that when the ratio of the abscissa's to the semiordinates may be expressed by any algebraick equation. See **CURVES**.

**GEOMETRICAL** *Progression*, a series of quantities in continued geometrical proportion, either increasing or decreasing in the same ratio; thus 1, 2, 4, 8, 16, &c. is a series of numbers in geometrical progression. See **PROGRESSION**.

**GEOMETRICAL** *Proportion*, or simply proportion, a similarity of ratio's; thus if  $B$  be to  $C$ , as  $D$  to  $E$ , they are in geometrical proportion; in like manner  $8 : 4 :: 10 : 5$ . And these are called geometrically proportionals. See **PROPORTION**.

**GEOMETRICAL** *Solution of a Problem*, is when the problem is solved by lines truly geometrical, in contradistinction to an instrumental or mechanical solution, namely by a ruler and compasses: it is also used in opposition to all indirect solutions, as by infinite series, &c.

**GEOMETRY**, originally signified no more than the art of measuring the earth, or any distances or dimensions on or within it; but it is now used to signify the science, of quantity, extension, or magnitude, abstractly considered, without any regard to matter.

Geometry is divided into speculative and practical; the first considers the extent of bodies, with regard to their three dimensions: practical is employed in measuring lines, superficies, and solids. Geometry passed from Egypt into Greece, and Thales of Miletus is believed to have carried it thither at his return from his travels. Pythagoras admitted no disciples who had not learned the principles of geometry. Anaxagoras, Plato, Aristotle, Architas, Eudoxus, &c. made this science their peculiar study.

The most illustrious of the ancients for geometry are Euclid and Archimedes. Euclid seems to have made speculative geometry his principal study, having left us

\* But the reducing the voluminous writings of the ancients, and the selecting every thing excellent from the most modern systems of Geography, including also the voyages undertaken by order of his present Britannick Majesty, and the King of France, for making discoveries in both hemispheres, seems to be an honour reserved for Mr. John Hamilton Moore, and certain gentlemen engaged in assisting him. His happy and successful talent of comprising much matter in a little space, has afforded us, beyond all doubt, the most concise and at the same time most complete system of Geography extant, under the title of **VOYAGES and TRAVELS**. To accommodate the publick, this work is publishing in weekly numbers, price only sixpence each, adorned with a more elegant set of Copper plates than has ever been given with any similar publication.



a work intitled the *Elements of Geometry* in fifteen books, though it be doubted, whether the two last be his. This work is considered as one of the most precious monuments of antiquity, with regard to natural knowledge. Archimedes was a sublime geometrician: his works are of the most exalted and abstracted kind. These two celebrated geometricians shew how far the ancients carried their knowledge in geometry. But it entirely changed its aspect in the last age by the new doctrine of fluxions. Sir Isaac Newton was the author of this wonderful discovery, and Leibnitz the first that published it in 1684, but under a different name. All the great geometricians entered with ardor the paths that had been lately opened for them; and in proportion to the progress of this sublime discovery, geometry extended her bounds. We are sometimes tempted to think the time very indifferently employed which is bestowed upon abstracted studies that seem to be of no immediate utility, and only proper to satisfy a vain curiosity. It is indeed true, that all the speculations of pure geometry and algebra are not immediately applied to useful things, but they either lead or relate to those that are of the greatest utility. Besides the aids which every branch of the mathematicks derives from geometry, the study of this science is of infinite advantage in the uses of life. Every one is desirous of thinking and reasoning rightly; and it has been justly observed, that the best practical logick is geometry. It is by this science the most certain knowledge we are capable of, by the light of nature, is acquired. It teaches us to contemplate truths, to trace the chain of them, subtle and almost imperceptible as it frequently is, and to follow them to the utmost extent.

**GEOPONICK**, any thing relating to agriculture.

**St. GEORGE**. See **GARTER**. There are several other military orders of St. George, some of which are now extinct, and others still subsist.

**GEORGICK**, in general, denotes any thing relating to the tillage, &c. of the ground; but more particularly it is applied to a poetical composition of Virgil consisting of four books, on the subject of husbandry, with rules relating thereto.

**GERANITES**, in natural history, an appellation given to such of the semipellucid gems, as are marked with a spot resembling a crane's eye.

**GERANIUM**, crane's-bill, in botany, an extensive genus of plants; several species of which grow naturally in England, some of which are esteemed the greatest vegetable vulneraries and astringents in the world, particularly in stopping hæmorrhages, and dissolving coagulated blood.

**GERM**, among gardeners, the same with bud. See the article **BUD**.

**GERMAN**, in genealogy, denotes entire or whole; thus, a brother-german is one both by the father's and mother's side; and cousins-german are the children of brothers or sisters.

**GERMANDER**, in botany, the English name of the teucrium of Linnæus. See **TEUCRIUM**.

**Water-GERMANDER**, a plant called by botanists scordium. See the article **SCORDIUM**.

**GERMEN**, or **GERM**, the same with bud.

**GERMINATION**, the first sprouting of the seeds of plants. See the article **VEGETATION**.

**GERVES's Engine**, a curious engine for raising water to supply a gentleman's seat, &c.

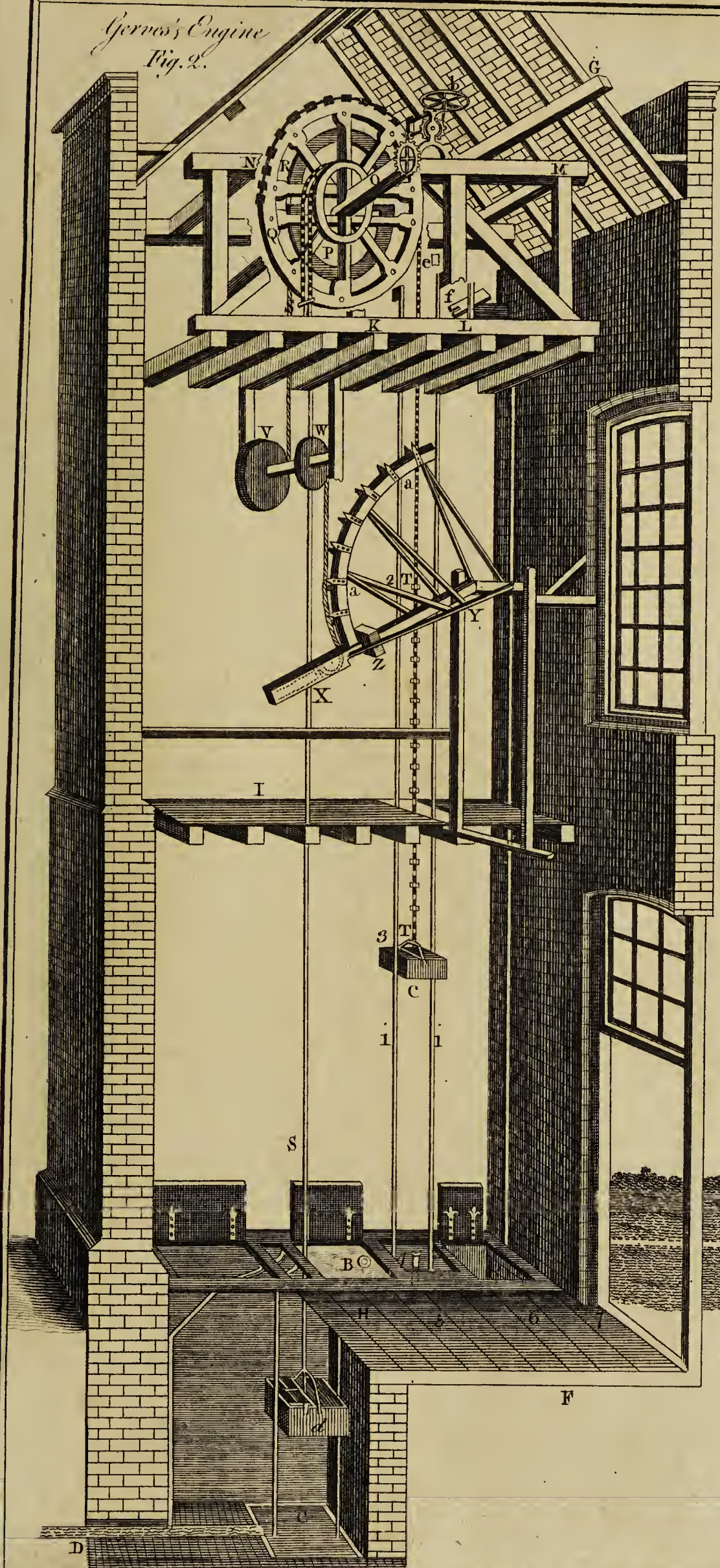
If there be a spring affording but a small quantity of water, and having but a small fall, suppose 10 feet, it is possible by the loss of some of the water to raise the rest to supply a gentleman's seat, or any place where it is wanted; but in a less quantity than what runs waste, if the place to which the water is to be raised be higher than the fall of the spring. For example, the fall of one hoghead 10 feet will raise very near a hoghead 10 feet: one hoghead, falling 10 feet, will raise very near  $\frac{1}{4}$  of a hoghead 40 feet. This has been thought of by Schottus a great many years ago, and he gave a draught of it; but it was never put in execution (at least to any good purpose) till the late George Gerves, carpenter, erected an engine for this purpose, for Sir John Chester, Bart. at his seat at Chichester, in Buckinghamshire.

Explanation of *plate XXXVII. fig. 2.* representing Gerves's engine. A, is a small spring of water, running 4 gallons per minute, conveyed 72 yards into B, a cistern holding about 12 gallons, with a fall from B to C. C, a cistern 10 feet below B, where the waste is conveyed off along D. D, a drain, or sewer. E, a plan of the building by a scale of 8 feet in an inch. F G, a section of the house built over the well or cistern, drawn by a scale of 4 feet in an inch; with H I K, three floors for the conveniency of fixing and ordering the engine; on the uppermost is L M N, a frame of timber, on which the moving part is supported (part broken off in the figure, to shew the work;) across this frame lies O, an horizontal axis, 3 feet and an half long, moving on two gudgeons in brasses. Upon this axis are framed three wheels. (1) P, a wheel 2 feet diameter shrouded, whose sole is 5 inches broad, and shod with iron. (2) Q, the largest wheel 6 feet diameter, lying close by the other, 1 inch and an half broad on the sole, and shrouded; this is spiraled 2 inches, both in sole and shrouds. (3) R, a wheel 3 feet 10 inches diameter, fixed on the sides of the spokes of the wheel Q, and shrouded; this is spiraled  $\frac{3}{4}$  of an inch. P. Upon the wheel P is fixed a chain, made flat and very flexible, which, after it has wrapped once round, is made double to stride on each side the single part, to prevent its fretting and galling, and to keep exactly the perpendicular. S S. To this chain is hung S S, a long rod of iron, at the bottom of which the greater bucket *d* is fixed. Q. Upon the wheel Q is fixed a smaller chain made flat as the other; and, when this wheel has made one revolution from left to right, the spiral sole takes up as much of the chain as is between T and T<sub>2</sub>. The lower part of the chain from T<sub>2</sub> to T<sub>3</sub> has cross bars, which fall upon the edge of the shroud in notches plated with iron; which, by the help of the spiral, not only prevent this part of the chain from riding upon the other, but help to equiponderate the increase of weight of the other chain S S. R. Upon the wheel R is fastened a rope, one end of which goes about V. V, a wheel of 2 feet diameter, to which that end is fixed; and on the same axis is fixed W. W, another wheel one foot diameter, to which is fastened a rope, which goes over a pulley to a sliding weight in a box to X. X, being the stilyard end of Y a a. Y a a, a quadrant wheel moving on the axis Y; the rope falling upon pulleys, running betwixt iron plates, upon the circumference. Z, is a lead weight, fixed to counterbalance the weight of the chains, keeping exactly an equilibrium in every position they move in. O. Upon one end of the axis O is a strong iron wheel, giving motion to a fly *b*, which regulates the motion of the engine. T T. Upon one end of the chain T T is a copper bucket *c*, whose capacity is about 5 gallons, having a valve in the bottom on the left hand, and a waste pipe near the top on the right: upon the lower end of the rod S S, is hung *d*. *d*, a copper bucket containing about 15 gallons; in the bottom of this is a valve opened by a trigger falling upon a stud at the bottom of the well. *i i*, are iron-rods for the guiding of the buckets, whose ears have brass rolls in them, and inclose three sides of each rod, which is square.

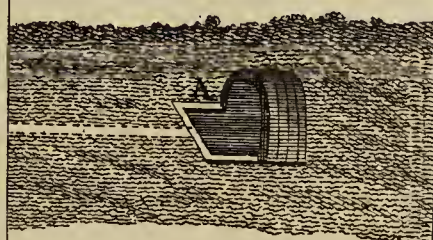
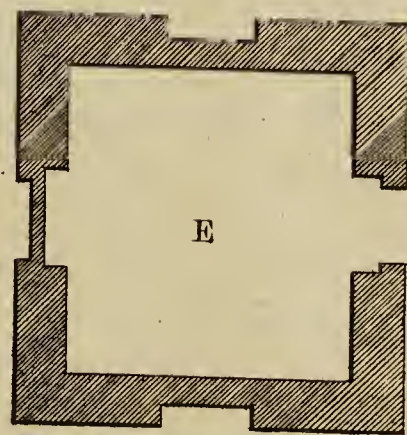
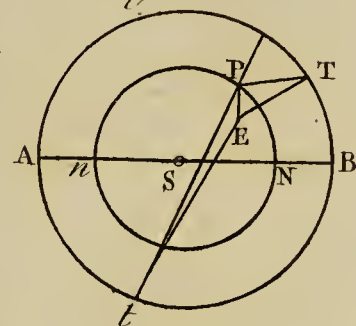
The operation. When the lesser bucket descends, it falls upon a trigger at 4, which is jointed to a treddle at 5, expressed with pointed lines, moving on an axis at 6, which by a rod at 7 opens a valve in the bottom of the cistern B; whence the water, by a brass cock and branch-pipe, is conveyed underneath into both buckets, *c* and *d*. When the lesser bucket has received about 4 gallons and an half, it runs out at the pipe or spout into a leaden trough, which conveys the water underneath the cistern into the great bucket, till it overpoises the lesser; which descending, and raising the lesser bucket, the valve shuts, and the water that is left in the trough and branch-pipe runs into the greater bucket *d*, accelerating the motion, which falling 10 feet, the lesser bucket rises 30 feet; which taking up the trough *f*, and its trigger striking upon a stud at *e*, its valve is opened, and its water runs out into a small cistern at *f*, and down a pipe *g g*, and so is conveyed to the place designed: at the same time a stud opens the valve of the greater bucket, the water



*Gervais's Engine*  
*Fig. 2.*



*Fig. 1. Geocentric*









running along D, the drain or sewer. When both buckets are empty, the lesser overpoises the greater, and descends down to the cistern, bringing up the greater, where they fill as before. To regulate the weight of the chains in every position, as they act in winding on and off the wheels P and Q, the spiraling of the wheels helps in some measure; but the quadrant wheel and stilyard X, with the weight Z, compleat the equilibrium, by acting with the greatest force in the horizontal position, when the chain T is all down, and acts with its whole weight upon the wheel Q; then, as the chain is drawn up, its acting weight being thereby diminished, the stilyard X is moving down towards its perpendicular, where the weight Z ceases to influence the motion of the wheel R; at which time the sliding weight runs down to keep the rope tight. At the first moving down of the lesser bucket, the weight X slides up to a shoulder, before any motion is given to the stilyard; but, whilst the chain T evolves from its wheel Q, its acting weight increasing; and, at the same time, the chain S wrapping itself upon the wheel P, its acting weight decreasing; the stilyard, by rising higher, brings the line of direction of the weight Z further from the centre of the quadrant, and so lays a greater force or obstruction to retard the wheel R, and continually keeps a counter-balance. The fly *b* regulates the motion of the engine to an equal velocity; and, by its running forwards, after the buckets are quite up or down, holds them steady till they begin to fill or empty, and prevents their recoiling back. This engine, at a slow motion, carries up one bucket full in 5 minutes; but, if the spring run double the quantity, it would go up twice in the same time; and an engine, in this kind, may be made to raise one hoghead per minute, or more, if required; the waste water not being the hundredth part of what is spent by a water-wheel, to raise an equal quantity of water to the same height.

GERUND, in grammar, a verbal noun of the neuter gender, partaking of the nature of a participle, declinable only in the singular number, through all the cases except the vocative.

GESTATION, among physicians, the same with pregnancy. See the article PREGNANCY.

GESTURE, in rhetoric, consists chiefly in the proper action of the hands and face. It is a kind of natural language, that supplies the use of speech in persons born dumb. See the article ACTION.

GEUM, *Avens*, in botany, a genus of plants whose flower consists of 5 roundish petals with narrow unguis the length of the cup, and inserted into it. A species of geum, which grows naturally in many parts of England, is sometimes used in medicine, and is esteemed a cephalick and alexipharmick.

GIAGH, in chronology, a cycle of 12 years; in use among the Turks and Cathayans.

GIBBOUS, in astronomy, a term used in reference to the enlightened parts of the moon, whilst she is moving from the first quarter to the full, and from the full to the last quarter; for all that time the dark part appears horned or falcated; and the light one hunched out, convex or gibbous. See MOON.

GIFT, in law, a conveyance, by which either lands or goods are passed: it is of larger extent than a grant, being applied to things moveable and immoveable.

GIGG, or JIGG, in musick, denotes a brisk and lively air; or any airy kind of dance, to a sprightly measure.

GILBERTINES, a religious order founded in England by St. Gilbert, in the reign of Henry I. The nuns followed the rule of St. Benedict, and the monks that of St. Augustin. There were many monasteries of this order in different parts of England.

GILDING, the art of spreading or covering a thing with gold, either in leaf or liquid. See GOLD. We have this advantage over the ancients, in the manner of using and applying the gold, that the secret of painting in oil, lately discovered, furnishes with means of gilding works, capable of enduring all the violences of time and weather, which theirs could not.

GILL, a measure of capacity, containing a quarter of a pint.

GILL is also a name for ground-ivy, which, being in-

fused in ale, makes what is known by the name of gill-ale; a sort of medicated ale, said to be absterfiv and vulnerary.

GIN, or GENEVA, among distillers. See GENEVA.

GIN, in mechanicks, a machine for raising great weights, fitted with a windlass and winches at each end, where 8 or 9 men heave, and round which a rope is reeved, that goes over a pulley at the top; and the whole supported by 3 feet, forming a triangle.

GINGER, a root too well known to need a long description: it is an excellent carminative and stomachick; it assists digestion, dispels the flatulency, and takes off cholicky pains often almost instantaneously. It is also highly esteemed by some as a cephalick, and is particularly said to strengthen the memory, and is often used as a corrective to purging medicines.

GINGERBREAD, a kind of rich bread, whose flavour is heightened with spices, particularly ginger; from which it takes its name.

GINGER-WINE is made as follows: take 3 gallons of water, an ounce of race-ginger, and 3lb. of sugar; boil them for an hour, and then put into it 3 lemons, and a little good yeast; close up the vessel, and let it stand 5 days: if it has so worked as to be clear in that time, it may be bottled; if not, let it stand longer, until it has worked sufficiently; and in 10 days after it may be drank.

GINGIVÆ, the gums, in anatomy, a hard sort of flesh, investing the alveoli, or sockets of the teeth. The gums consist of the common membrane of the mouth, and the periosteum of the jaws, to which they adhere very closely and firmly. They are furnished with a vast number of blood-vessels, whence their florid red colour; and they serve for the covering of the jaws, and the keeping of the teeth fast in their sockets.

GINGLYMUS, in anatomy, a kind of articulation resembling a hinge. The alternative or reciprocal diarthrosis, the ancient Greeks termed ginglymus, and mechanicks charnal. It is chiefly divided into two kinds: as in one of these motions the two bones always form an angle, it may be termed an angular ginglymus, which is exactly the same with the motion of a hinge. The second kind is adapted only to small turns toward each side, and therefore is termed a lateral ginglymus. In the angular ginglymus either each bone partly receives, and partly is received by the other, there being reciprocal eminences and cavities in each, as in the articulation of the os humeri with the ulna; or there are only several eminences in one bone, received into the same number of cavities in the other, as in the articulation of the os femoris with the tibia. The lateral ginglymus is either single, as in the articulation of the first vertebra of the neck with the apophysis dentiformis of the second; or double, that is, in two different parts of the bone, as in the articulation of the ulna with the radius.

GINSENG, a root lately brought into Europe, and extolled with immoderate praises; but its great price has prevented its hitherto coming into general use. It is an oblong root never growing to any great size; its usual standard is about 4 or 5 inches in length, and its thickness that of the little finger. It is seldom gathered when much less than this, and rarely grows to be much larger. Ginseng is of a very agreeable and aromatick smell, though not very strong; its taste is acrid and aromatick, and has somewhat bitter in it. It is to be chosen sound and firm, moderately heavy, not too tough, and of a good smell. Before it be bought, it will be prudent to cut every root through, for the Chinese, of whom we have it, frequently find a way to introduce pieces of lead into it, to increase the weight.

The Chinese value the ginseng so highly, that it sells with them for three times its weight in silver. They, as well as the Asiatics in general, think the ginseng almost an universal medicine: they have recourse to it in all diseases, as the last remedy, and readily give themselves over when it will not cure them; but the virtues most generally ascribed to it, are those of a restorative, a provocative, and a cordial. It is famous in the east for giving strength to those who have disabled themselves by the too free use of women: there they also recom-

mend



mend it greatly in the small-pox, fevers of all kinds, disorders of the stomach and bowels, and tell us, that diarrhoeas and dysenteries are cured by it: but they caution people not to give it in too large doses to persons of a florid sanguine constitution, on whatever occasion it may be necessary to them. The European physicians esteem it a good medicine in convulsions, vertigoes, and all nervous complaints, and recommend it as one of the best restoratives known. Its dose is from 10 grains to 20 in powder; and from 1 dram to 2 to the pint, in infusions.

**GIRDERS**, or **GIRDING BEAMS**, in architecture, the largest timbers in a floor. Their ends are usually fastened into the summers or breast-summers, and the joists are framed in at one end into the girders. By the statute for rebuilding London, no girder must lie less than 10 inches into the wall, and their extremities always laid in loam.

**GIRDLE**, *Cingulum* or *Zona*, a belt of leather, &c. tied round the reins. In ancient times insolvent debtors surrendered their girdle in open court, because as our ancestors carried all their necessary utensils, as purse, keys, &c. hanging at their girdle, this became a symbol of the estate.

*Quicksilver* **GIRDLE**, in medicine, a kind of girdle made of flannel, linnen, &c. which is besmeared with mercury, when killed by hog's lard, &c. and worn round the patient's waist, in order to cure the itch, destroy vermin, &c.

**GIRON**, or **GUIRON**, in heraldry, a triangular figure with a long sharp point, like a wedge, terminating in the centre of the escutcheon. When there are 8 girones which are alternately metal and colour, the shield is absolutely termed gironne; but when the number is over or under, it must be particularly specified.

**GIZZARD**, a part in a fowl, which performs the same office as the stomach does in other animals. The gizzard is made of such a strong contexture as readily to grind its contents; for which purpose the bird swallows rough stones, which, when grown smooth, are cast out as of no further use. Dr. Harvey observes that this grinding may be heard in falcons, eagles, &c.

**GLACIS**, in fortification, a declivity or sloping bank that reaches from the parapet of the counterscarp or covert way, to the level of the circumjacent fields. It is otherwise called *esplanade*, being 6 feet high and gradually diminishing till it be lost in the space of 10 fathoms.

**GLADE**, in gardening, &c. an open prospect cut through a wood or grove, &c.

**GLADIATORS**, in antiquity, persons who fought, generally, in the arena at Rome for the entertainment of the people.

**GLAND**, *Glandula*, *Glandule*, in anatomy, a soft, spongy kind of body, that serves to separate a particular humour from the blood. Glands are either simple or compound; the latter consist of the former, and are both contained in one common membrane. Those of the simple kind convey their proper humour through their own lymphatick ducts either to the chyle or to the venous blood; or else they discharge their contents, either on the external parts of the skin, or the surfaces of the loose membranes, which are every-where found in the body; but the compound glands, by means of a proper canal, discharge their humours formed in every part into a larger canal, and at last, by means of this common emissary, into the large cavities, especially those of the mouth and intestines, or quite out of the body, for particular purposes. The simple glands are also called conglobate, and the compound conglomerate glands.

The simple glands are formed of a certain exterior and slender membrane, together with a subjacent one, to which the other closely adheres; the former is composed of circular and elastick fibres, every-where comprehends, braces up, compresses, and expresses the contained liquor, and consists principally of a contexture of the small vessels, which enter it and are sent out from it. The latter, which is thicker and more dense, consists of fibres running almost in all directions, and of an intricate and perplexed contexture of the small vessels: it is subservient almost to the same purposes with the former. These

membranes receive the arteries, support their ramifications in a due and unalterable order, and accurately convey and distribute these ramifications to every the most minute parts of the gland; so that an injection of wax or quicksilver, by increasing the bulk of the small arteries, and compressing the other vessels, would almost make us think, that the whole fabrick of the gland was arterial. These membranes have also veins disposed in the same direction with the smaller arteries, and more and larger nerves than any part of the body of an equal bulk; and these nerves are also so distributed through the small body of the gland, that they seem almost to make up the whole of it. These membranes, of which the glands consist, have also lymphatick vessels, which arrive at and are sent out from them.

Their arteries are conical, inflected, ramous, elastick, and gyrated canals, whose extremities are cylindrical, and no longer ramous, but changed into veins; but before these small arteries are thus changed, they communicate with each other by an infinite number of anastomoses, and various positions at an infinite number of different angles; so that their extremities vary very greatly in different glands. The arterial blood, therefore, conveyed to the glands, is moved very briskly; for there is a great resistance, a compression, a mutual pressure of the parts upon each other, an oblique pressure, a continual permutation of contracts; every-where a multifarious application to all the most minute points of the canals, a various rotation at every moment, and an opposite pressure in every particle; a distribution of the humours into the ramifications, and a return thereof to the ramifications; an attenuation, an attrition, a preservation of fluidity, solidity, secretion, and a due mixture.

In the mean time, the ramifications arising from the trunk of the artery are generally narrower than the trunk at that particular part whence they arise: this happens even in the most minute ramifications, so that the ultimate ramifications are smaller than the smallest part of the common trunk; the ultimate trunks transmit the red and thickest part of the blood, and convey it to the beginnings of the small veins. The smaller ramifications receive finer, more fluid and pellucid parts, smaller than the diameters of the respective cavities, pressed through them by an oblique, opposite, and strong force.

But this subtle fluid, destitute of the thicker parts, is no longer blood, but some other liquor of various kinds, such as sweat, perspirable matter, or that discharged by the cutaneous pores, tears, pinguious wax, the wax of the ears, mucus, saliva, spit, mucilage, lymph, serum, bile, seed, oil, milk, and fat. Hence the ultimate ramifications, losing their former name of artery, are denominated from the nature of the fluid they contain; and as they often assume all the properties of an artery, they will also have their smaller ramifications and veins. Hence there are both arteries and veins destined for the serum, the lymph, the aqueous parts, and the spirits, as well as for the blood. Nor is it known where this progression terminates; but by this means we come to know the origin, the progress, the end, and the office, of the lymphatick vessels.

The ramifications, however, of any such artery, when no longer ramous, but direct, and collected in the finest membrane of the most minute glandular follicle, opening the mouths of the extremities, discharge their contained fluid into a common cavity, formed by that fine membrane, where being collected, it in some measure remains, and is the glandular lymph there prepared and accumulated. It is probable that the nerves of the glands, by a familiar apparatus, discharge their spirits into this common cavity, where they are mixed with the lymph, and furnish it with the qualities it naturally ought to have. In the mean time the lymphatick arteries often convey the lymph received into their small veins, furnished with valves, by us called vascular lymph, to these glands; and by a different apparatus convey it into the same follicle, where it is mixed with the glandular lymph and spirits, in order to supply a most subtle part, in the room of that which is lost.

Then this compound humor is, by the contractile force of the fibrous membrane, the motion of the artery, and



and the pressure of the muscles, carried through the egredient lymphatick veins into other glands, where it is again to undergo the same action; and thence into the receptacle of the chyle, the thoracick duct, or the blood-vessels: and such seem to be conglobate glands in all the parts of the body.

But, in other glands, the case is quite different; since this follicle immediately expels through its proper emissary the liquor it receives, into some common cavity: thus the secreted mucus is deposited, collected, and changed in the frontal sinuses, the sinuses of the superior jaw, the cellulae of the os sphenoides under the sella turcica, the excavations of the spongy bones of the nostrils, the cavities of the nostrils, and the lacunae of the tonsils. Of this kind seem to be the mucilaginous glands of the mouth, of the back part of the tongue, of the exterior and inferior part of the epiglottis of the internal part of the nostrils, of the meatus auditorius of the larynx, of the aspera arteria, of the bronchia, of the oesophagus, of the stomach, and of the intestines, which species of glands may be called simple excretory glands.

Again, other glands, with a similar apparatus, discharge their prepared liquors through proper emissaries, arising from the common cavity without the skin, as the glands in the external auditory passage, in the pinnae nasi, in the exterior part of the nose, in the beginning of the internal part of the nostrils, in the face, in the neck, in the axillae, in the scapulae, in the areolae of the nipples and navel, in the hips, in the areola of the anus, in the peritonaeum, in the pubes, in the mons Veneris in both sexes, in the scrotum, in the integuments of the penis, in the lips of the female pudenda, and in the knees. The glands of this kind are now called sabaceous glands.

But of these simple glands already described, or of others highly similar to them, united by common vessels, and wrapped up in a common membrane, are formed the compound or conglomerate glands. These are generally furnished with a common emissary, which receives the humours from all the emissaries of the other parts, collects them, and discharges them again into some other larger cavity. Of this kind are the glands of the eye, the parotids, the pancreas, and some others. This common cavity or receptacle, ending in an emissary, frequently is either first changed, as it were, into an arterial inflected vessel, which induces some change in the humours they convey, and by an apparatus, like an artery, discharges them into an open and potent receptacle; as in the testes, the ductus Highmorianus, the epididymis, the vas deferens, and the vesiculae feminales; or, secondly, it is immediately conveyed into a common emunctory.

Hence, it is certain that, by means of the glands, there are separated from the arterial blood, water, lymph, a fine serum, and also the salts, spirits, and highly subtle parts of the oils mixed with these; that all these, either becoming stagnant, are collected, changed, and accumulated in certain places; or forced through the small vessels into the most minute parts of the body, for the purposes of motion and nutrition, and thence return to the heart by their proper veins, or are exhaled; and that the part of the blood, after this remaining in the arteries, enters the veins which become gradually wider, is mixed with similar blood, diluted with lymph, and returns to the heart.

For this reason the arterial blood is, about the heart, highly diluted, but gradually becomes thicker, and is thickest of all, most viscid, and easily concreted, in the end of the artery, that is, the beginning of the vein; for which reason it requires a vessel capable of obstruction, and an admixture of some diluting liquor, that is, of lymph which has assumed its due quality by having performed its several offices, and is returning to the heart. It also requires an admixture of spirits: but these circumstances must happen to it, before it can be again conveyed into the pulmonary arteries; otherwise the blood would be only fit for performing one course of circulation. Hence, we know the particular parts, the disorders of which most eminently endanger health, and the continuation of life. Hence also we know how much the large vessels, the thick humours, the

small vessels, and the subtle humours, contribute to the strength, stability, and flexibility of the body.

Hence, further, we understand why the veins becoming gradually larger, lax, fit for the concurrence and dilution of the humours, should perform their respective offices, before a fresh return of the blood to the heart can be performed.

GLANDERS, among farriers, a disease incident to horses, consisting of a thick slimy, corrupt humour running from the nostrils. Mortimer has given us the following receipt for curing the glanders: Take a pint of chamber lye; 2 ounces of oil of turpentine; half a pint of vinegar; 4 ounces of flower of brimstone; half a handful of rice; boil this composition till it comes to a pint, and give it to the horse fasting; and let him fast after it 6 hours from meat, and 12 from water.

GLANDULAR, or GLANDULOUS, among anatomists, something abounding with, or partaking of the nature of glands.

GLANDULE, or GLANDULA, a term used by anatomists to express a small gland. See GLAND.

GLANDULOUS ROOTS, among botanists, signifies such tuberous ones as are connected together by small fibres, such are dropwort, potatoes, &c.

GLANS, in anatomy, the anterior extremity of the penis, called by other different names, as the head of the penis, the nut of the penis, and the balances of the penis. Glans is also used to denote the tip or extremity of the clitoris, from its resemblance both in form and use to that of the penis. The principal difference consists in this, that it is not perforated as is the glans of the penis.

GLASS, a kind of facitious, brittle, and transparent body, produced by the action of fire upon a fixed salt and sand that readily melts. The chymists tell us, that there is no body in nature but may be vitrified, or converted into glass, which is the last effect of fire, as all its force is not able to carry the change of any natural body beyond its vitrification.

*Antiquity and History of GLASS.* When or by whom the art of making glass was found out is uncertain: some say it was invented before the flood, but do not pretend to bring any proof of their opinion. Neri traces back its antiquity to the time of Job; but Dr. Merret, not content with this, will have it to be as ancient as pottery, or the art of making bricks; because a kiln of bricks can scarce be burnt, but some of the bricks will be at least superficially turned into glass, so that it must have been known at the building of Babel; and perhaps long before. It must have been well known to the ancient Egyptians when the Israelites were employed by them in making bricks. Of this kind, no doubt, was that fossil glass mentioned by Ferrant. Imperat. to be found under ground in places where great fires had been. The Egyptians indeed boast, that this art was taught them by the great Hermes. Aristophanes, Aristotle, Alexander, Aphrodisæus, Lucretius, and John the divine, put us out of all doubt that glass was in use in their days.

Pliny relates, that it was first discovered accidentally in Syria, at the mouth of the river Belus, by certain merchants driven thither by a storm at sea, who being obliged to continue there, and dress their victuals, by making a fire on the ground, where there was great plenty of the herb kali; that plant burning to ashes, its salts mixed and incorporated with sand, or stones fit to vitrify, and produced glass: that this accident being known, the people of Sidon, in that neighbourhood, assayed the work, improved the hint, and brought it into use; and that this art has been improving ever since.

Venice, for many years, excelled all Europe in the fineness of its glasses, but of late the French and English have excelled the Venetians, so that we are no longer supplied with this commodity from abroad.

The court of France applied itself, with a laudable industry, to cultivate and improve the *glass* manufacture. A company of glass-men was established by letters patent; and it was provided by an arret, not only that the working in glass should not derogate any thing from nobility, but also, that none but nobles should be allowed to carry it on. Notwithstanding which encouragement, we do at this time surpass them in every branch of the



art. As we have great pleasure in doing justice to ingenuity in general, and particularly to that of our own countrymen, we embrace the opportunity of saying, that we are indebted for the present very considerable improvements in the art and manufacture of *glafs* to the ingenious Mr. Parker, of *Fleet-street*. His singular abilities have rendered him known in every part of Europe, where the arts are encouraged, as a very great mechanical genius, and the first artist in this particular branch of business.

*Nature and Characters of GLASS.* Naturalists are divided in what class of bodies to rank glass; some making it a concrete juice; others a stone; others again rank it among semi-metals; but Dr. Merret observes, that these are all natural productions, whereas glass is a factitious compound, produced by fire, and never found in the earth, but only the sand and stone that form it; the metals are formed by nature into certain species; and that fire only produces them, by its faculty of separating heterogeneous and uniting homogeneous bodies: whereas it produces glass, by uniting heterogeneous matter, viz. salt and sand, of both which it evidently consists; one hundred pound weight of sand yielding above one hundred and fifty pounds weight of glass.

The same learned doctor gives us a precise and accurate enumeration of the several characters, or properties of glass, whereby it is distinguished from all other bodies, viz. 1. That it is an artificial concrete of salt and sand, or stones. 2. Fusible by strong fire. 3. When fused, tenacious and coherent. 4. It does not waste nor consume in the fire. 5. When melted, it cleaves to iron. 6. When it is red hot, it is ductile, and may be fashioned into any form; but not malleable; and capable of being blown into a hollowness, which no mineral is. 7. Frangible when thin, without annealing. 8. Friable, when cold. 9. Diaphanous, whether hot or cold. 10. Flexible and elastick. 11. Dissoluble by cold and moisture. 12. Only capable of being graven or cut with a diamond, or other hard stone, and emery. 13. Receives any dye or colour both externally and internally. 14. Not dissoluble by aquafortis, aqua regia, or mercury. 15. Neither acid juices nor any other matter extract either colour, taste, or any other quality from it. 16. Admits of polishing. 17. Neither loses weight nor substance by the longest and most frequent use. 18. Gives fusion to other metals, and softens them. 19. The most pliable thing in the world, and that which best retains the fashion given it. 20. Not capable of being calcined. 21. An open glass being filled with water in the summer-time, will gather drops of water on the outside, just so far as the water on the inside reaches; and a person's breath blown on it will manifestly moisten it. 22. Little glass balls filled with water, mercury, and other liquor, and thrown into the fire; as also drops of green glass being broken, will fly asunder with a great noise. 23. Neither wine, beer, nor any other liquor, will make it musty, or change its colour, or rust it. 24. It may be cemented, as stone, and metals. 25. A drinking glass, partly filled with water, and rubbed on the brim with a wet finger, yields musical notes, higher or lower as the glass is more or less full, and will make the liquor frisk and leap.

*Materials for making of GLASS.* The materials whereof glass is made, we have already mentioned to be salt and sand, or stones. The salt here used, is procured from a sort of ashes, brought from the Levant, called pulverine, or rochetta; which ashes are those of a sort of water-plant, called kali, cut down in summer, dried in the sun, and burnt in heaps, either on the ground, or on iron grates: the ashes falling into a pit, grow into a hard mass, or stone, fit for use. See the articles KALI, and PULVERINE.

To extract the salt, these ashes or pulverine, are powdered and sifted, then put into boiling water, and there kept till one third of the water be consumed; the whole being stirred up, from time to time, that the ashes may incorporate with the fluid, and all its salts be extracted: then the vessel is filled up with new water, and boiled over again, till one half be consumed;

what remains is a sort of lee, strongly impregnated with salt. This lee, boiled over again in fresh coppers, thickens in about 24 hours, and shoots its salt; which is to be laded out, as it shoots, into earthen pans, and thence into wooden fats to drain and dry. This done, it is grossly pounded, and thus put into a sort of oven, called calcar, to dry. It may be added, that there are other plants, besides kali, which yield a salt fit for glass: such are the alga or sea-weed, the common way-thistle, bramble, hops, wormwood, woad, tobacco, fern, and the whole leguminous tribe, as pease, beans, &c. The sand or stone, called by the artists tarso, is the second ingredient in glass, and that which gives it the body and firmness. These stones, Agricola observes, must be such as will fuse; and of these such as are white and transparent are best; so that crystal challenges the pre- cedency of all others.

At Venice, they chiefly use a sort of pebble found in the river Tesino, resembling white marble, and called cuogolo. Indeed Ant. Neri assures us, that all stones which will strike fire with steel, are fit to vitrify; but Dr. Merret shews, that there are some exceptions from this rule. Flints are admirable; and when calcined, powdered and searced, make a pure white crystalline metal; but the expence of preparing them makes the masters of our glass-houses sparing of their use. Where proper stones cannot be so conveniently had, sand is used; which should be white and small, and well washed, before it be applied: such is usually found in the mouths and sides of rivers. Our glass-houses are furnished with a fine sand for crystal, from Maidstone, the same with that used for sand-boxes, and in scouring; and with a coarser for green-glass, from Woolwich.

For crystal glass, to 200lb. of tarso, pounded fine, they put 130lb. of salt of pulverine; mix them together, and put them into the calcar, a sort of reverberatory furnace, being first well heated. Here they remain baking, frying, and calcining for five hours; during which the workman keeps mixing them with a rake to make them incorporate; when taken out, the mixture is called frit, or bollito.

It may be further observed, that glass might be made by immediately melting the materials without thus calcining, and making them frit: but the operation would be much more tedious. A glass much harder than any prepared in the common way, may be made by means of borax, in the following manner: Take four ounces of borax, and an ounce of fine white sand, reduced to powder, and melt them together in a large close crucible set in a wind furnace, keeping a strong fire for half an hour: then take out the crucible, and when cold, break it; and there will be found at the bottom a hard pure glass, capable of cutting common glass almost like a diamond. This experiment duly varied, says Dr. Shaw, may lead to some considerable improvements in the art of glass, enamels, and artificial gems. It shews us an expeditious method of making glass without the use of fixed salts, which has generally been thought an essential ingredient in glass, and which is the ingredient that gives common glass its softness; and it is not yet known, whether calcined crystal, or other substances, being added to this salt instead of sand, might not make a glass approaching to the nature of a diamond.

*Kinds of GLASS.* Of these materials we have many sorts of glass made, which may principally be distinguished according to their beauty; as the crystal flint glass, the crystal white glass, the green glass, and the bottle glass. Again, these sorts are distinguished by their several uses; as plate or coach-glasses, looking-glasses, optick-glasses, &c. which are made of the first sort. The second sort includes crown-glass, toys, phials, drinking-glasses, &c. The third sort is well known by its colour, and the second by its form.

*Furnaces for making GLASS.* In the manufacture of glass, there are three sorts of furnaces; one is for the frit, called the calcar. The second is for working the glass. The third serves to anneal the glass, and is called the leer. The catcar resembles an oven, 10 feet long, 7 broad, and 2 deep. The fuel, which in England is sea-coal, is put in a trench on one side of the furnace, and







Fig. 2.

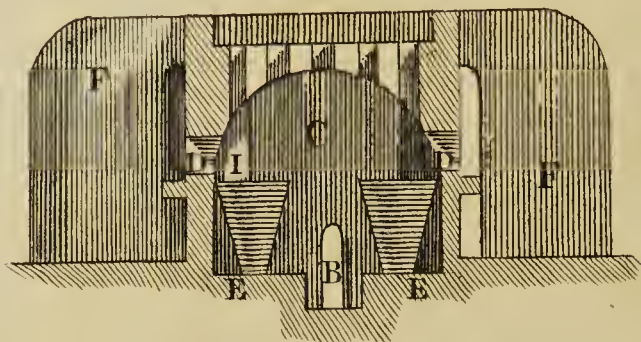


Fig. 1.

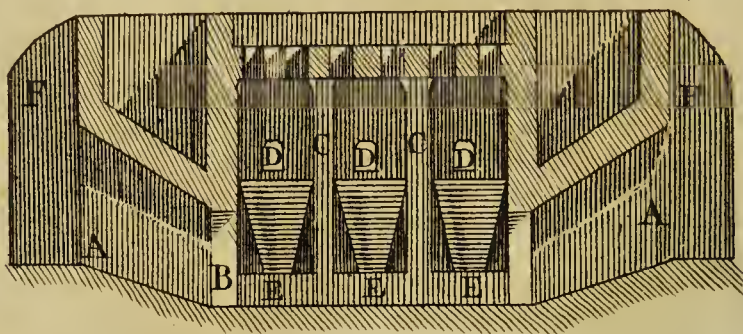


Fig. 3.

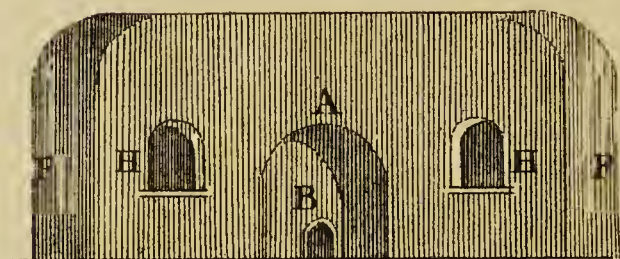
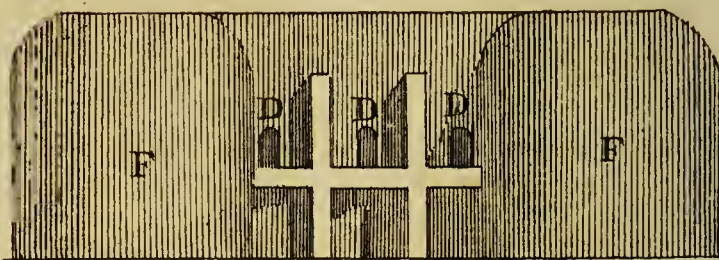
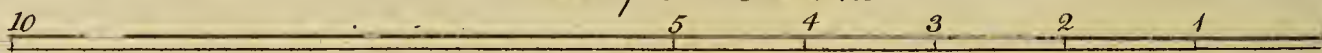


Fig. 4.



Scale of Ten Fathoms





and the flame, reverberating from the roof upon the frit, calcines it.

The glass furnace, or working furnace, is of a circular form of 3 yards diameter, and 2 high; and is divided into 3 parts, each of which is vaulted. The lower part is properly called the crown, and is made in that form. Its use is to keep a brisk fire of coal and wood, which is never put out. The mouth of it is called the bocca. There are several holes in the arch of this crown through which the flames pass into the second vault or partition, and reverberate into the pots filled with the ingredients above-mentioned. Round the inside are eight or more pots placed, and piling pots on them. The number of pots is always double that of the boccas, or mouths, or of the number of workmen, that each may have one pot refined to work out of, and another for metal to refine in, while he works out the other. Through the working-holes the metal is taken out of the pots, and the pots are put into the furnace. These holes are stopped with moveable covers, made of lute and brick, to screen the workmen's eyes from the scorching flames. On each side the bocca, or mouth, is a boccorella, or little hole, out of which coloured glass or finer metal is taken from the piling-pot. Above this oven, there is a third oven or leer, about 5 or 6 yards long, where the vessels or glass is annealed or cooled; this part consists of a tower, besides the leer, into which the flame ascends from the furnace. The tower has two mouths through which the glasses are put in with a fork and set on the floor or bottom, but they are drawn out in iron pans, called fraches, through the leer to cool by degrees, so that they are quite cold by the time they reach the mouth of the leer, which enters the sarofel or room, where the glasses are to be stowed.

The green glass furnace is square, having at each angle an arch for annealing and cooling the glasses. The metal is wrought on two opposite sides, and on the other two they have their calcars, into which are made linnet holes for the fire to come from the furnace to bake the frit, and to discharge the smoke; fires are made in the arches to anneal the work; so that the whole process is done in one furnace.

These furnaces must not be made of brick, but of sandy stones. In France, they build the outside of brick, and the inner part, to bear the fire, is made of a sort of fuller's earth, or tobacco-pipe clay, of which earth they also make their melting-pots.

Mr. Blancourt observes, that the worst and roughest work in this art is the changing the pots, when they are worn out, or cracked. In this case the great working-hole must be uncovered, the faulty pot must be taken out with iron hooks and forks, and a new one must be speedily put in its place through the flames by the hands only. For this work the operator guards himself with a garment made of skins in the shape of a pantaloon, that covers him all but his eyes, and is made as wet as possible; the eyes are defended with a proper sort of glass.

*Instruments used in making GLASS;* the instruments made use of in this work may be reduced to the following: a blowing pipe made of iron, about two feet and a half long, with a wooden handle. An iron rod to take up the glass, after it is blown, and to cut off the former. Scissors to cut the glass, when it comes off from the first hollow iron. Sheers to cut and shape great glasses, &c. A large iron ladle, with the end of the handle cased with wood, to take the metal out of the refining-pot, and put it into the workmen's pots. A small iron ladle, cased in the same manner, to take off the alkaline salt, that swims at top. Shovels, one like a peel to take up the great glasses, another like a fire-shovel to feed the furnace with coals. A hooked iron fork, to stir the matter in the pots. An iron rake for the same purpose, and to stir the frit. An iron fork, to change or pull the pots out of the furnace, &c.

*Working or blowing round GLASS;* the tools thus provided, the workman dips his blowing pipe into the melting-pot, and by turning it about, the metal sticks to the iron more firmly than turpentine. This he repeats four times, at each time rolling the end of his instrument with the hot metal thereon, on a piece of iron, by the side of which is a vessel of water, which helps

to cool, and so to consolidate, and to dispose that matter to bind more firmly what is to be taken next out of the melting-pot. But after he has dipped a fourth time, and the workman perceives there is metal enough on the pipe, he claps his mouth immediately to the other end of it, and blows gently through the iron tube, till the metal lengthens like a bladder, about a foot. Then he rolls it on a marble stone a little while to polish it, and blows a second time, by which he brings it to the shape of a globe, of about 18 or 20 inches in circumference. Every time he blows into the pipe, he removes it quickly to his cheek, otherwise he would be in danger, by often blowing, of drawing the flame into his mouth. And this globe may be flattened by returning it to the fire, and brought into any form by stamp-irons, which are always ready.

When the glass is thus blown, it is cut off at the collet or neck, which is the narrow part that stuck to the iron. The method of performing this is as follows: the vessel is rested on an iron bar, and a drop of water being laid on the collet, it will crack about a quarter of an inch, and with a slight stroke or cut with the sheers, will immediately separate the collet.

This being done, the operator dips his iron rod into the melting-pot, by which he extracts as much metal as serves to consolidate the glass he has made to the end of his rod, and applies it to the bottom of his work, or that opposite to the opening made by the breaking of the collet. In this position the glass is carried to the bocca, to be heated and scalded; by which means it is again reduced to so soft a state that it may, by the help of any iron instrument, be pierced, opened, and widened without breaking. But the vessel is not quite finished till it has been returned to the great bocca, where it is again thoroughly heated and turned about with a quick circular motion, and opened to the intended size by the heat and motion. If any superfluities remain they are cut off with the sheers; for till the glass is cool it continues in a soft flexible state. It is then taken from the bocca and carried to an earthen bench covered by coals almost extinguished, where it is kept continually turning till it is sufficiently cool, by which the surface is preserved smooth and even, when by a slight stroke by the hand of the workman, the vessel is separated from the iron rod.

*Explanation of Plate XXXVIII. representing the Manner of blowing Window or Table Glass.*

The lower compartment of the plate, represents the inside of a glass-house with the men employed in the several operations. *a*, the mouth of the furnace, where the matter is refined, with a workman scumming the liquid matter in the pot. *b*, a workman rolling the metal taken from the furnace, on the iron rim of a vessel about half filled with water. *c*, a workman blowing the metal, which he rests on an iron plate. *d*, a workman rolling the metal on the iron rim of a tub, about three quarters filled with water, while the person at *e*, drops a small quantity of water on the collet, in order to separate it from the rod. *f*, a workman holding the blown metal in a perpendicular situation, in order to lengthen it. *g*, a workman rolling it on the earthen bank covered with live cinders, in order to lengthen the vessel, and keep the surface smooth. *h*, a servant bringing several utensils to the workmen.

The upper compartment represents two back sections and two views of the furnace.

*Fig. 1.* is a back section of the longer side of the furnace. *A, A*, the chimnies. *B, B*, the sides of the furnace. *C, C*, the pillars that support the roof of the furnace. *D, D, D*, the boccas or mouths of the furnace, through which the metal is taken. *E, E, E*, the pots containing the liquid metal. *F, F*, the two arches of the furnace.

*Fig. 2.* Section of the back part of the shorter side of the furnace. *B*, the mouth of the furnace. *C*, the fore part of the furnace. *D, D*, the apertures through which the fire passes and reverberates on the metal in the pots. *E, E*, the pots filled with metal; and *E, E*, the fire at the bottom of the pots. *F, F*, the arches of the furnace.



*Fig. 3.* A front view of the back section *fig. 2.* A, the great arch. B, the bocca. F, F, the arches of the furnace. H, H, the two boccas.

*Fig. 4.* A front view of the section *fig. 1.* D, D, D, the boccas. F, F, the arches of the furnace.

The figure on the lower compartment of the plate represents the cistern, casting table, &c. at large.

*Working or blowing Table GLASS.* The above method, in every particular, is applicable to the working of window or table glass, till the blowing iron has been dipped the fourth time; for then, instead of rounding it, the workmen blows and so manages the metal upon the iron plate, that it extends two or three feet in length, in the form of a cylinder. This cylinder is again put into the fire and blown a second time, and the operation repeated till it is extended to the dimensions required; the side to which the pipe is fixed, diminishing gradually, till it terminates in a conical form. So that to bring both ends nearly to the same diameter, the workman adds, while the glass is thus flexible, a little hot metal to the end opposite to the pipe, and draws it out with a pair of iron pincers, and immediately cuts off the same end, by dropping on it a little cold water. The cylinder being thus opened at one end, it is carried back to the bocca, where, by the help of cold water, it is cut off about eight or ten inches from the end of the pipe or rod; and the whole cylinder laid open by the shears, and laid on a copper table, where it falls into a flat form, opening like a sheet of paper.

*Casting or running of large Looking-GLASS Plates.* The furnace is of a very large dimension, environed with several ovens, or annealing furnaces, called carquasses, besides others for making of frit, and calcining old pieces of glass. This furnace, before it is fit to run glass, costs 3,500*l.* It seldom lasts above 3 years, and even in that time it must be refitted every 6 months. It takes 6 months to rebuild it; and three months to refit it. The melting pots are as big as large hogsheds, and contain about two thousand weight of metal. If one of them bursts in the furnace, the loss of the matter and time amounts to 250*l.* The heat of this furnace is so intense, that a bar of iron laid at the mouth thereof becomes red-hot in less than half a minute. The materials in these pots are the same as described before. When the furnace is red-hot, these materials are put in at three different times, because that helps the fusion; and in 24 hours they are vitrified, refined, settled, and fit for casting. The metal is then put into a large pot called a cistern. These cisterns are filled in the furnace, and remain therein 6 hours after they are filled, and then are hooked out by the means of a large iron chain, guided by a pulley by two or more men. When the cistern is brought to the casting-table they slip off the bottom of the cistern, and out rushes a torrent of flaming matter upon the table: this matter is confined to certain dimensions by iron rules, which are moveable, retain the fluid matter, and determine the width of the glass, while a man with a roller resting on the edge of the iron rulers, reduceth it as it cools to an equal thickness, which is done in the space of a minute. This table is supported on a wooden frame, with trusses for the convenience of moving to the annealing furnace; into which, strewed with sand, the new plate is shoved, where it will harden in about ten days. After this the glass needs only be ground, polished, and foliated for use.

*Explanation of Plate XXXIX. representing the Manner of casting Plate Glass.*

The lower compartment of the plate represents the inside of a glass-house of this kind. 1, 2, persons who support the cistern in its proper position; 3, 4, men holding the iron roller; 5, 6, persons who hold the iron roller fast, till the metal is poured out of the cistern upon the table; 7, 8, two persons who direct the metal that flows over the sides of the table, into the troughs, placed on each side of the table, for that purpose; 9, 10, two other persons standing behind those that manage the roller, to take care of the metal that flows over the table by the motion of the cylinder, and convey it into the

troughs; 11. the workmen who manage the crane; 12. a workman with an instrument in the form of a cross, directing the metal as it flows from the cistern, and keeping it nearly of an equal thickness; 13. a person who carries away the glass-plate after it is sufficiently cooled, upon a carriage, to the annealing furnace.

*Painting in GLASS,* the art of representing figures, landscapes, &c. on glass in proper colours stained in the glass.

The first thing to be done, in order to paint or stain glass in the modern way, is to design and even colour the whole subject on paper.

2. To chuse pieces of glass proper to receive the several parts:

3. To divide or distribute the design itself, or papers it is drawn on, into pieces, suitable to those of the glass, always taking care that the glasses may join in the contours of the figures, and the folds of the draperies.

4. To order them so, that the carnations may not be impaired by the lead, with which the pieces are to be joined together.

5. Having made the distribution, take care to mark all the glasses as well as papers, that they may be known again.

6. Then applying each part of the design upon the glass intended for it, transfer the design upon the glass with the black colour diluted in gum water, by tracing and following all the lines and strokes, as they appear through the glass with the point of a pencil.

7. Then the glasses must be set by till they are thoroughly dry, which will be in about two days; then the work being in black and white, is to have a slight wash over with urine, gum-arabick, and a little black, and repeated several times, according as the shades are desired to be heightened, with this precaution, never to apply a new wash till the former is sufficiently dried. This done, the lights and risings are given by rubbing off the colour in their respective places, with a wooden point or the handle of the pencil.

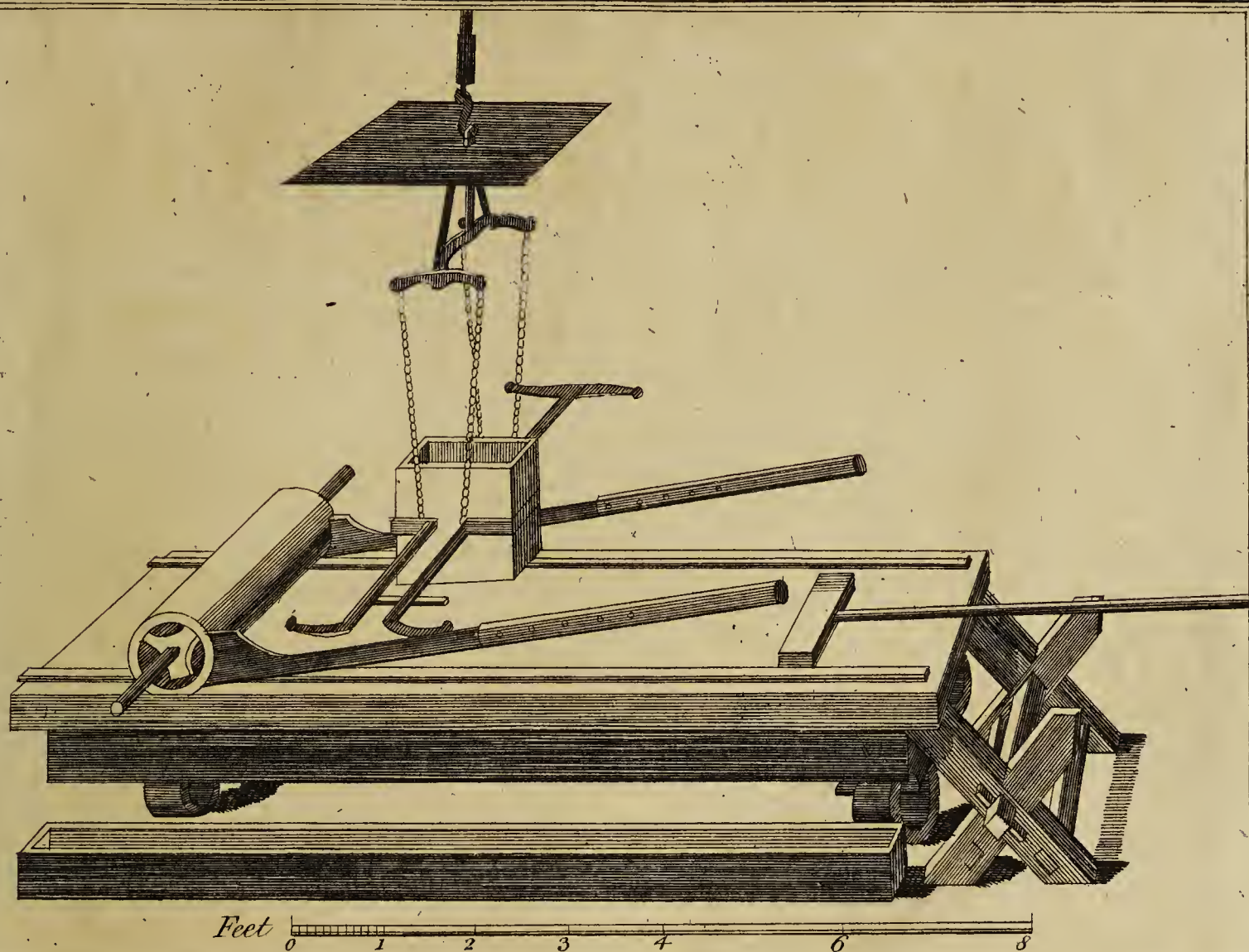
Then having all your colours in readiness, fill your pieces with colours, for which use the nib of the pencil, especially in carnation, where you must be very exact; you must also be very circumspect and expeditious, and take a great deal of care not to blot or blur the tracings, and chuse rather to paint on the other side of the glass. All the colours, except yellow, may be applied on the same side, and that you must do on the contrary side, because it is apt to mingle with the other colours, and, if near the blue, will compose a green; so that, for want of such precaution, the whole work may be spoiled; if the yellow transmits itself perfectly through the quarre, it is as well as if it had been done on the same side; and take notice by the way, that the other colours have not so ready a transmittion, because they consist of a grosser body. The yellow ought to be very equally and justly laid on, in a greater or less quantity, as you would have your shadows; observe this too in the rest, especially to lay them on as quick as possible, as we have already said, particularly the azure green and purple require the most exactness of any.

Now to set off and heighten the lights, in piling a beard, describing hair in drapery, or otherwise, use the handle or large end of the pencil, a small-pointed stick or quill, wherewith take off the colours in those places you would enlighten, which is easily done.

Such works as are done in grisaille, you must paint after this manner: trace your piece with black, and let it dry for two days intirely; do it over very lightly and equally with a wash so thin laid on as not to efface the first lines, and let it dry for two days: after this, run them over again with the same wash where you find it convenient to give a second tinge, and let it dry two days longer; then, to give it the lights and convenient heightening, sharpen the butt-end of your pencil, or take a pointed stick or pen, as before, and take off the colour of the first wash in the most necessary places, and so your work will be finished. When the painting of all the pieces is finished, they are carried to a furnace to anneal, or bake the colours.

The furnace here used is small, built of brick, from 18 to 30 inches square; at 6 inches from the bottom is











is an aperture to put in the fuel, and maintain the fire. Over this aperture is a grate, made of three square bars of iron which traverse the furnace, and divide it into two parts. Two inches above this partition is another little aperture, through which they take out pieces to examine how the coction goes forward. On the grate is placed a square earthen pan, 6 or 7 inches deep, and 5 or 6 inches less every way than the perimeter of the furnace. On the one side hereof is a little aperture, through which to make trials, placed directly opposite to that of the furnaces destined for the same end. In this pan are the pieces of glass to be placed in the following manner: first, the bottom of the pan is covered with three strata, or layers, of quick lime pulverized; those strata being separated by two others of old broken glass, the design of which is to secure the painted glass from the too intense heat of the fire. This done, the glasses are laid horizontally on the last or uppermost layer of lime.

The first row of glass they cover over with a layer of the same powder, an inch deep; and over this they lay another range of glasses, and thus alternately till the pan is quite full; taking care that the whole heap always end with a layer of the same powder. The pan being thus prepared, they cover up the furnace with tiles, on a square table of earthen ware, closely luted all round, only leaving five little apertures, one at each corner, and another in the middle, to serve as chimnies. Things thus disposed, there remains nothing but to give the fire to the work. The fire for the first two hours must be very moderate, and must be increased in proportion as the coction advances, for the space of 10 or 12 hours; in which time it is usually completed. At last the fire, which at first was charcoal, is to be of dry wood, so that the flame covers the whole pan, and even issues out at the chimnies.

During the last hours, they make essays, from time to time, by taking out pieces laid for the purpose through the little aperture of the furnace and pan, to see if the yellow be perfect, and the other colours in good order. When the annealing is thought sufficient, they proceed with great haste to extinguish the fire, which otherwise would soon burn the colours, and break the glasses.

**Burning-GLASSES.** See also the article BURNING-GLASSES. In order to account for the nature of burning-glasses, whether mirrors or denses, we must consider the area of their surfaces, and the focal distance, because both these quantities enter into the expression of their power of burning.

The diameter of the sun is seen from the earth, under an angle of  $32'$  of a degree; therefore the diameter of the solar spot in the focus of Villettes's mirror will be  $0.358$  of an inch; for in the isosceles triangle ABC (plate XV. fig. 1.) we have given the angle  $ABC = 32'$ , and the perpendicular BD (the focal distance) = 38 inches, to find AC, the diameter of the solar focus.

As the radius is to the tangent of the angle ABD, so is the focal distance BD, to the semi-diameter AD of the solar spot =  $0.1733$ ; whence  $AC = 0.3466$ ; but the diameter of the mirror was 47 inches: now  $47 \times 47 = 2209$ , and  $0.3466 \times 0.3466 = 0.12013156$ ; wherefore the density of the rays in the focus will be to their common density as 2209 to  $0.128164$ , which shews that the mirror condensed the solar rays eighteen thousand three hundred and eighty-eight times.

Since rays but 35 times denser than in their natural state with us, have a power of burning equal to wood-fire, if we divide 18385 by 35, the quotient will be 526; therefore such a mirror will burn with an intensity of heat 525 times greater than common fire. No wonder, then, that bodies which remain unaltered by the force of our greatest common fires, (as that of a glass-house, where gold has been found to lie several days in fusion, without any sensible loss of weight) should immediately become fused, fume away in part, part be dissipated and driven away in large particles, and remain in the form of a caput mortuum, all which phenomena have been observed of gold, in the focus of a large burning-glass: and how rudely such a glass would treat the principles of the chymists, and what confusion it would induce

in their arithmetick of elements, they will be better certified of, when they shall attempt to analyse nature, and reduce substances to their original principles, by more active and effectual means than laboratories at present afford.

Notwithstanding the prodigious density of the rays of the focus of these large burning-glasses, yet it has been always observed, that the rays reflected to us by the moon, when at full, and centered in the focus of those glasses, produce no heat that is sensible in the least degree, as is demonstrated by holding a thermometer in the focus of lunar rays, which always remains without the least appearance of motion. The reason of this will appear by the following calculation.

Let ABD (plate XV. fig. 2.) be the earth, C its centre, MO the moon, N the centre, N to the circle between  $bd$  the semi-diameter of the moon, which is equal to 10875 English miles, the semi-diameter of the earth  $DC = 4000$  miles; the distances of the centres of the earth and moon  $NC = 240000$  miles: then since the rays of the sun's light at the moon are of the same density, as with us (as being parallel); and since the lunar rays are only the solar rays reflected to us by the convex surface of the moon; and lastly, since parallel rays are reflected by a spherical convex surface in such a manner, as to go after reflection diverging from a point, which is  $\frac{1}{2}$  the radius of the sphere distant from the vertex; therefore, supposing the surface of the moon to be perfectly spherical and smooth, we compute the density of the solar rays reflected from the moon to the earth, as follows.

Let  $a, b, c, d$ , be two parallel solar rays falling on the surface of the full moon, these rays will be reflected to the earth in the directions  $bg$  and  $db$  diverging from the point of dotted lines in the radius N and the circle between  $bd$ , half way between N and the circle between  $bd$ . Now the density of the rays falling on the moon will be to those reflected at the earth's surface, as the square of  $gb$  to the square of  $bd$ , or as the square of the point of dotted lines D to the square of the point of dotted lines to the circle between  $bd$ ; but the point of dotted lines the circle between  $bd = 544$  miles, and the point of dotted lines D ( $= NC - CD - N$  the point of dotted lines  $= 240000 - 4544 = 235456$ ; and the square of 235456 is to the square of 544, as 187400 to 1 nearly; consequently the density of the lunar rays is to that of the solar rays at the earth's surface, as 1 to 187400 nearly; therefore a burning-glass must condense the lunar rays 187400 times, to make them have the head of common sun-beams. But this is 10 times more than Villettes's mirror can effect.

Now all this is upon supposition that the moon is a sphere, and its surface perfectly smooth, whereas neither of these things have place in nature; for the moon is not a sphere but a spheroid, and her surface very uneven; on both these accounts, the reflection of light must be many times weaker than we have supposed it; and accordingly M. Bouguer, by experiments, has found that it is about 17 times less, or that the density of the lunar rays is to that of the solar, as 3000000 to 1; wherefore, a burning-glass must condense the rays from the moon near 3000000, i. e. three millions of times, to make them of sufficient warmth to raise the liquor of the common thermometer; which is an effect almost 200 times greater than Villettes's mirror can produce.

**GLASS of Lead**, a glass made with the addition of a large quantity of lead; of great use in the art of making counterfeit gems.

**GLASTENBURY-THORN**, a species of Mespilus. It differs from the common haw-thorn, by its flowering twice a year; that is, in May or June, the season the other blossoms, and in November, December, or January, according to the mildness of the season. But as to the story of its blowing particularly on Christmas-day, it is a meer fiction, and deserves not the least credit.

**GLAUBER'S SALT**, a cathartick or purging salt, thus made. Take of the cake that remains after the distillation of Glauber's spirit of sea-salt; dissolve it in hot water, and filtre the solution through paper: then reduce the salt into crystals. It is given in doses from half an ounce to an ounce.



and observe how many degrees and minutes are between them: or thus, with a pair of compasses, set one foot upon the place, and open the compasses till the other foot stands upon the other place, then carry this distance to the equator, and setting one foot of the compasses upon the first meridian, observe how many degrees and minutes it is, which you may turn into English miles, by multiplying by 69.5.

2. To find all places that are at a given distance from a place given: for example, to find all places that are ten degrees from London; open a pair of compasses till they measure ten degrees upon the equator, then setting one foot upon London, turn the other round, and it will pass through all the places that are ten degrees from London. By the same method we find all places that are at an equal distance from any given place: thus setting one foot of a pair of compasses upon London, and turning the other round through Rome, we see all places that are at the same distance from London that Rome is; as also what places are nearer to, or further from London than Rome is.

3. To find the latitude of any place upon the globe: bring the place to the meridian, and the degree and minute under which it lies shew its latitude; thus, bring London to the meridian, as in *fig. 2.* and it appears to be in  $51^{\circ} 31'$  north latitude. If a place lying under the equator be brought to the meridian, the mark over it will be 00, because it has no latitude. See LATITUDE.

4. To find all places which have the same latitude with a given place: suppose the given place be London, turn the globe round, and all places that pass under the same point of the meridian that London doth, have the same latitude with London. To find the difference of latitude of two given places of the globe, as London and Paris: find the latitude of each place; and the difference is easily known.

5. To find the longitude of any place upon the globe: bring the place to the meridian, and the degree and minute of the equator the meridian then passes through is the longitude: thus, if Rome be brought to the meridian, its longitude will appear to be  $12^{\circ} 45'$ , upon our English globes, which have the first meridian drawn through London.

6. To find all places which have the same longitude with a given place, as Naples, it is sufficient to bring Naples to the meridian; for all places then under the meridian have the same longitude with Naples; to find the difference of longitude of two places, find the longitude of each, and the difference is easily known.

7. To find a place upon the globe, its longitude and latitude being given: let the place be Aracta, the longitude of which is  $44^{\circ} 55'$ , east, from London, and latitude  $36^{\circ} 0'$  north: bring  $44^{\circ} 55'$  of the equator to the meridian, and under the  $36^{\circ}$  of north latitude is Aracta, or the place where it ought to be: for this method will serve to insert a place upon the globe, its longitude and latitude being given.

8. To rectify the globe to the latitude of any place: let the place be London, which lies in  $51^{\circ} 31'$  north lat. move the brass meridian in the notches till the north pole of the globe is elevated  $51^{\circ} 31'$  above the north side of the horizon, that is, till the elevation of the pole is equal to the latitude, as in *fig. 2.*

9. To rectify the globe to the horizon of any place, as London: rectify the globe to the latitude of London, and bring London to the meridian; the horizon of the globe will then represent the horizon of London.

10. To find towards what place of the compass any place lies from a given place: if it be enquired towards what point of the compass Lisbon lies from London, rectify the globe to the horizon of London, screw the centre of the quadrant of altitude to the zenith point of the meridian, and turn the other end round till the graduated edge passes through Lisbon; then observe what point of the horizon in the circle in the winds the graduated edge passes through, which in the present case will be south-west by south, we say then Lisbon lies south-west by south from London.

11. To find the angle of position between any place and a given place: if it be enquired what is the angle of position of Lisbon and London, that is, what angle a

great circle drawn through those two places makes with the meridian of London, do every thing directed in the last problem, and observe how many degrees of the horizon are contained between the graduated edge of the quadrant altitude and meridian, which in the present case will be  $33^{\circ} 45'$ ; the angle of position of Lisbon with regard to London, is then  $33^{\circ} 45'$ .

12. To rectify the globe to the meridian of the place where we are, which is the same thing as to rectify the globe to the situation the earth is in every day when it is noon at that place: suppose the place is London, rectify the globe to the horizon of London, then turn the frame of the globe about till the north and south points of the horizon of the globe are towards the north and south: the south may be known by the sun at noon; the north by the pole-star any time of the night: the globe may also be rectified to the meridian of any place, by a meridian line, or by a magnetick needle in a compass-box.

13. To rectify the globe to the present situation of the earth at any hour of the day: if you be in London, and would bring the globe into the situation the earth is in at four in the afternoon; rectify the globe to the meridian of London, and put the index of the hour circle to 12; and since the rotation of the earth carries the meridian and hour circles of London upon the globe coinciding with the like circles upon the earth, turn the globe to 4 o'clock, and the situation thereof will then correspond to that of the earth; and if it stands in the sun, it will be illuminated as the earth is.

14. The hour of the day being given at one place, as London, to find what hour it is at any other place upon the globe, as Naples: rectify the globe to the horizon of London, set the hour index at twelve at noon, turn the globe round till Naples is at the meridian, the index will then shew what hour it is at London, when it is noon at Naples: thus, if it points at 11 in the morning, it shews that it is 11 in the morning at London, when it is noon at Naples; and consequently, whatever is the time given at London, the time of the day at Naples is an hour forwarder in the day; as if it be two in the afternoon at London, it is three in the afternoon at Naples, &c.

15. By knowing the time of any particular phenomenon, to find its position in the heavens, and where it may be visible: bring that part of the globe to which the sun, moon, or planet, will be vertical at the given time, to the zenith; then will such phenomena as are momentary, be visible to all the inhabitants of the earth that are now above the horizon: and if you rectify the quadrant, and lay it over each particular place, it will shew the altitude of it, as also the azimuth; opposite to which in the heavens is the vertick circle, in which the object will be found.

Thus the middle position of an eclipse, transit, or occultation of the heavenly bodies may be nearly determined to any given place upon earth; but for the beginning and end of the same, a new operation will be required.

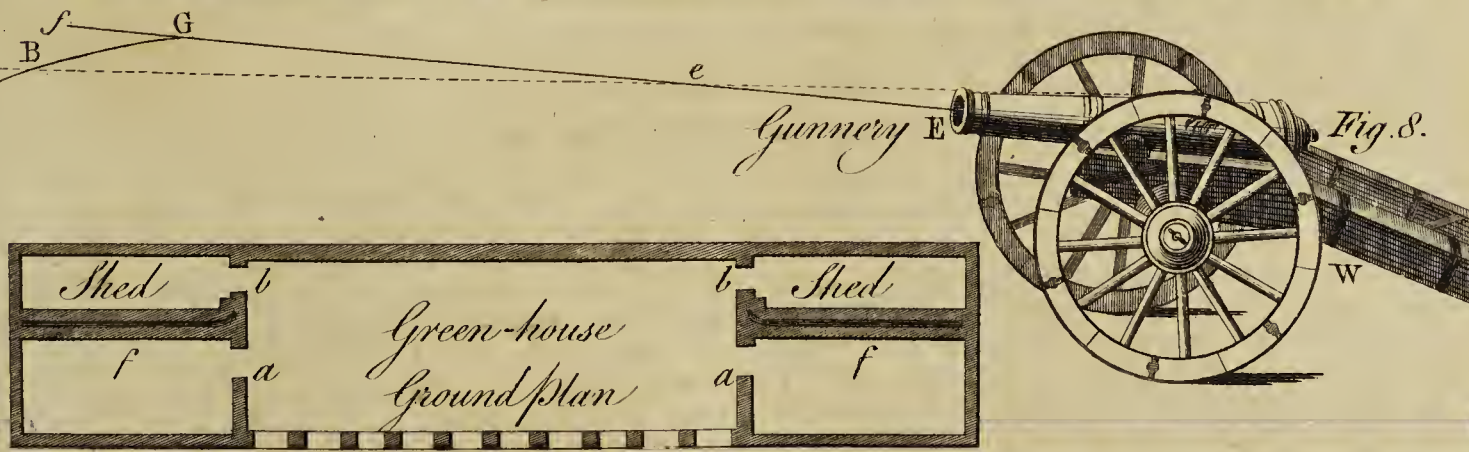
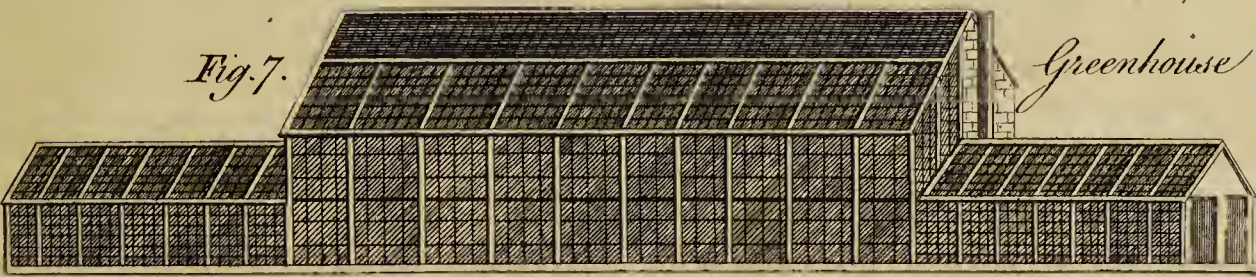
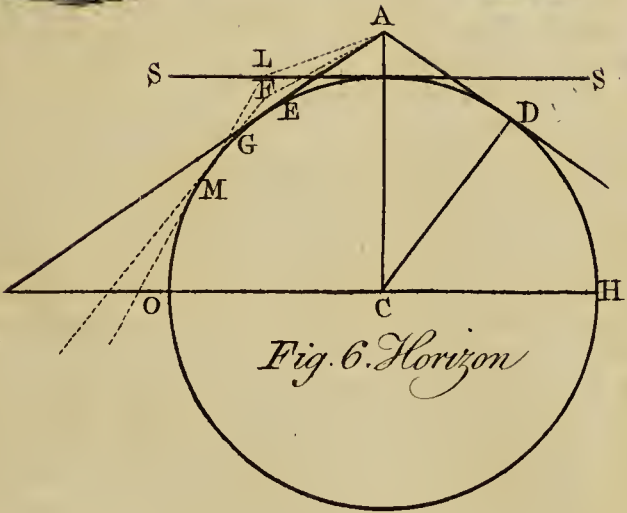
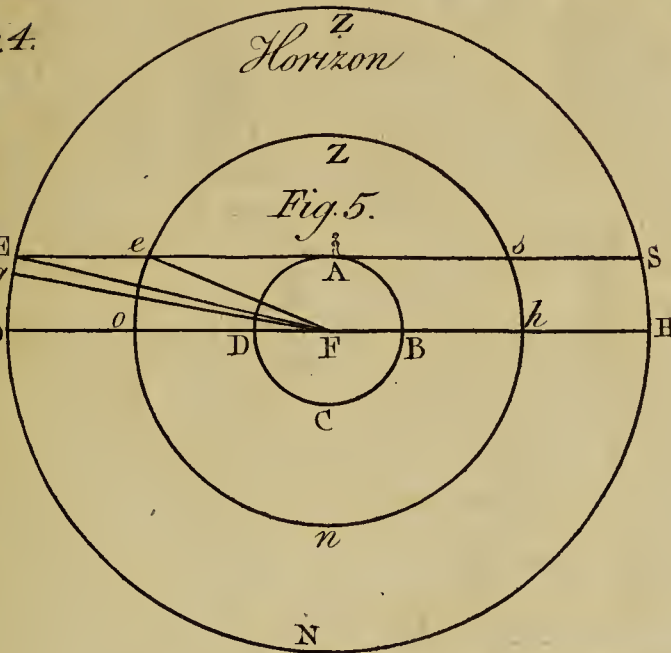
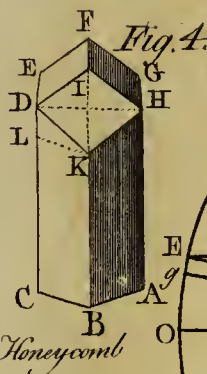
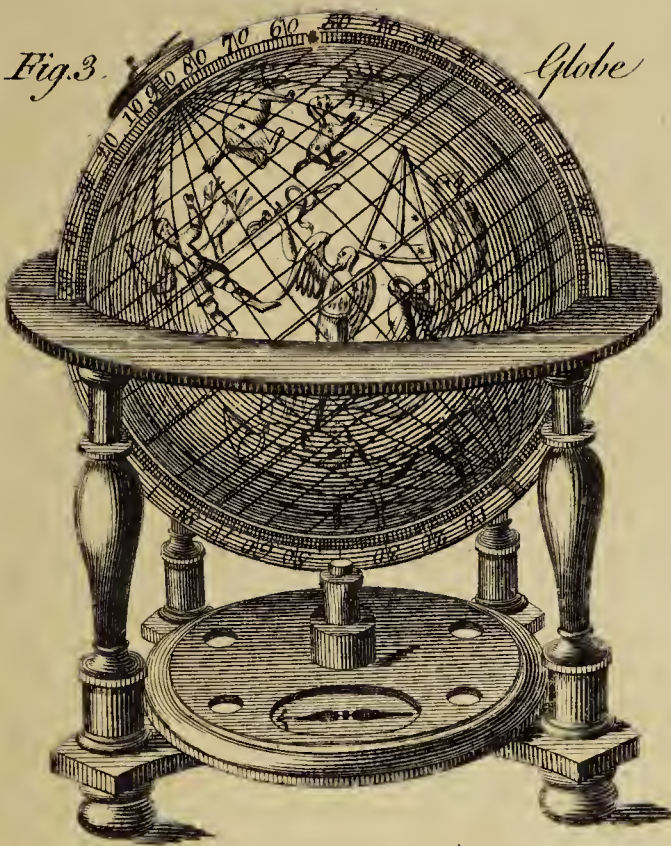
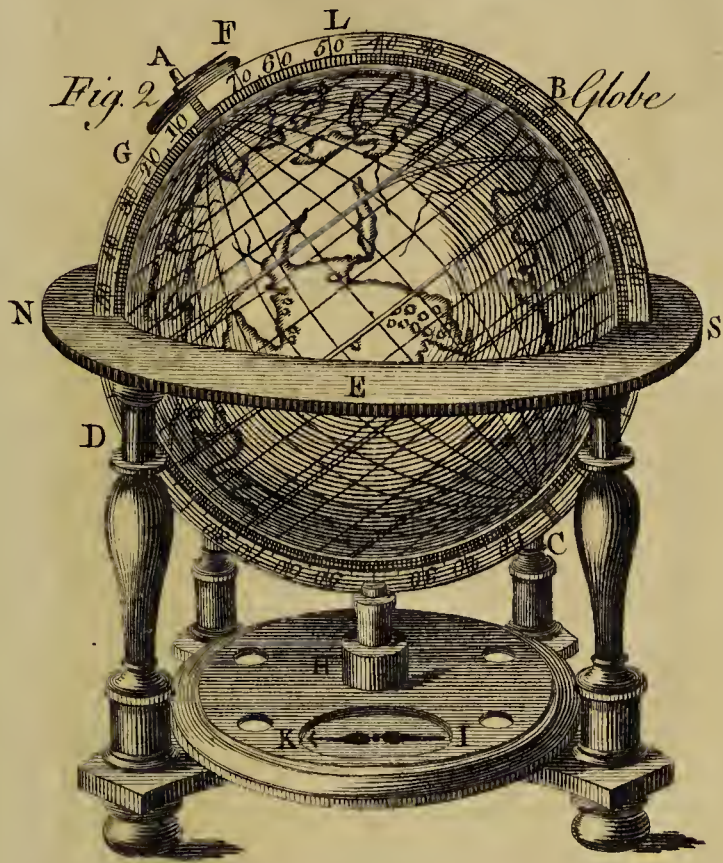
*Problems more immediately relating to the Celestial GLOBE.*

1. To find the right ascension and declination of any star. The given star being found, bring the centre of it to the south-part of the meridian; then, right above it, you will find the declination, and in the equinoctial, the right ascension: the former in the meridian, the latter cut by it.

2. To find the latitude and longitude of any star, and the place of any star, and the place of any planet, if marked on the globe: First, bring the solstitial colure to the brazen meridian, that is, to be directly under it: then elevate or depress the pole of that hemisphere, in which the star is found, till the poles of the ecliptick be exactly in the zenith and nadir, that is, till the ecliptick coincide with the horizon; keeping the globe in this position, rectify the quadrant of altitude, and move it till its graduated edge pass or lie just over the centre of the given star, and there fix it. Then see what degree lies over-against the star's centre on the quadrant, and what portion of the ecliptick, now lying in the horizon, is cut by the quadrant, and the former will be the latitude of the said star, and the latter its longitude from Aries.

3. To find the rising and setting of any star, &c. The globe being rectified, bring the star, whose rising is required, to the east part of the horizon; then the index











of the hour circle will shew the hour and minute of its rising; and in like manner, if the globe is turned to the west, it will shew the setting.

N. B. The rising and setting of any star being found in hours and minutes, the one subtracted from the other, that is, the first from the last, gives the nocturnal arch, or the time of its stay above the horizon: but if the setting be less than the rising, add twelve hours thereto, and from the whole deduct the rising, and there will remain the sum required.

4. To know at any time what stars are ascending or descending, move the globe about, all things being rectified as above to the given hour, and there fix it; and then observing what stars lie even with the horizon, those on the east side are said to be rising, and those to the west setting. Those under the meridian are said to be culminating, being then full south; as those on the east side of the globe are ascending, and those on the west descending, what are below the horizon being invisible. Lastly, if you place the quadrant of altitude over the centre of any particular star, it will shew you its altitude, and at the same time gives, upon the horizon, the azimuth required.

5. How to distinguish one star from another in the heavens, and know them by their names on the globe. The meridian being placed due north and south, and the globe rectified to the time and latitude required, each part of the globe will correspond with its respective constellation in the heavens; so that if the globe was transparent, and the observer's eye placed in the centre, every artificial star painted upon it would appear concentrick with the real one.

To find their amplitude, and their oblique ascension or descension, observe what degree of the equator rises or sets with each or any one of them, and that is the thing required; or if the amplitude be desired, see upon what point of the compass they first appear, and then that distance from the east, or west point of the horizon, reduced into degrees, will give the quantity of the amplitude required.

6. To find the hour of the night. The globe being rectified, bring the given star to the quadrant of altitude, and see that the known elevation, which in this case must always be taken by observation with an instrument, be cut thereby, then will the hour index point to the time required; or if any known star be in the meridian, the hour will be shewn, without knowing the altitude by the index only.—In like manner may be found the hour of the day by the sun, his altitude being given.

7. To know what stars are visible in any latitude, and in what latitude any particular star first appears: rectify the globe according to the latitude of the place required, and then, turning it round, you will, according to the season of the year, find what constellation will be visible at that time.

If again you bring any particular star to the meridian, and move the globe so as to bring the said star to the horizon, you will find, by allowing for the density of the atmosphere in proportion to their several magnitudes, in what latitude it will first become visible.

N. B. All those stars whose distance from the elevated pole is less than the latitude of the place, never set to their respective inhabitants; as their opposite ones, being equally depressed, never rise.

A correspondent, whose letter we have just now received, recommends in the strongest terms the *Patent Globes*, those with Mr. Neale's improvements, for which he obtained his Majesty's letters patent.

GLOBULARIA, globe-daisy in botany, a genus of plants, producing flosculous flowers; each floret is formed of a single petal, tubular at the base, and divided into four segments at the limb; the universal corolla is nearly equal; it is destitute of a pericarpium; but the proper cup, which is connivent, includes the seed, which is single and ovated.

GLOBULAR, in general, an appellation given to things of a roundish figure, like that of a globe.

GLOBULE, a diminutive of globe, frequently used by physicians in speaking of the red spherical particles of the blood. See BLOOD.

GLORIA PATRI, among ecclesiastical writers. See the article DOXOLOGY.

VOL. I. No. 35.

GLORIOSA, superb lilly, in botany, a genus of plants, the flower of which consists of six oblong, lanceolated, undulated, and very long petals, reflex nearly to the base; the fruit is an oval pellucid capsule, containing three cells, and numerous globose seeds, disposed in a double series.

GLOSS, in matters of literature, denotes an exposition or explication of the text of any author, whether in the same language, or any other; in which sense it differs little from commentary. See COMMENTARY.

GLOSS, among artificers, the lustre or brightness set upon cloth, silk, and the like. See CLOTH, SILK, &c.

GLOSSARY, *Glossarium*, a sort of dictionary, explaining the obscure and antiquated terms in some old author.

GLOSSOCOMON, in surgery, an instrument, or sort of case, contrived by the ancient surgeons, for containing a fractured leg or thigh.

GLOSSOCOMON, in mechanics; the name by which Hiero calls a machine, composed of several dented wheels, with pinions, and used for raising great weights.

GLOSSOPETRA, in natural history, a genus of extraneous fossils, so called from their having been supposed the tongues of serpents turned to stone, though they are really the teeth of sharks, and are daily found in the mouths of those fishes, wherever taken.

GLOTTIS, in anatomy, the mouth or aperture of the larynx, through which the air ascends and descends in respiring. It is of an elliptick figure, and furnished with cartilages and muscles, by means of which it is occasionally dilated or straightened, so as to give that wonderful variety of notes, of which the voice is capable, in speaking and singing.

GLUE, among artificers, a tenacious viscid matter, which serves as a cement to bind or connect things together. Glues are of different kinds, according to the various uses they are designed for, as the common glue, glove-glue, and parchiment-glue; whereof the two last are more properly called size. See SIZE.

The common or strong glue is chiefly used by carpenters, joiners, cabinet-makers, &c. and the best kind is that made in England, in square pieces of a ruddy brown colour; and, next to this, the Flanders glue. It is made of the skins of animals, as oxen, cows, calves, sheep, &c. and the older the creature is, the better is the glue made of its hide. Indeed, whole skins are but rarely used for this purpose, but only the shavings, parings or scraps of them; or the feet, sinews, &c. That made of whole skins, however, is undoubtedly the best; as that made of sinews is the very worst.

*The Method of making GLUE.* In making glue of parings, they first steep them two or three days in water; then washing them well out, they boil them to the consistence of a thick jelly; which they pass, while hot, through ozier baskets, to separate the impurities from it, and then let it stand some time, to purify it further: when all the filth and ordures are settled to the bottom of the vessel, they melt and boil it a second time. They next pour it into flat frames or moulds, whence it is taken out pretty hard and solid, and cut into square pieces or cakes. They afterwards dry it, in the wind, in a sort of coarse net; and at last string it, to finish its drying. The glue made of sinews, feet, &c. is managed after the same manner; only with this difference, that they bone and scour the feet, and do not lay them to steep.

GLUME, *Gluma*, among botanists, a kind of cup, consisting of two or three membranous valves, which are often pellucid at their edges. This sort of cup belongs to the grasses.

GLUTÆUS, in anatomy, the name of 3 muscles, which form the buttocks, and from their size are called maximus, medius, and minimus. They all arise in the external surface of the ilium, ischium, and os sacrum: the termination of the first, or greatest, is about 4 fingers-breadth from the great trochanter, and the terminations of the two others are in this trochanter.

GLYCINE, a kidney-bean tree, in botany, a genus of plants, whose flower is papilionaceous. The fruit is an oblong pod, containing several kidney-shaped seeds, of a scarlet colour, spotted with black.

GLYCONIAN VERSE, in ancient poetry, consists of three feet, whereof the first is a spondee, the second



a choriambus, and the last a pyrrichius; or the first may be a spondee, and the other two dactyls.

**GLYCYRRHIZA**, liquorice, in botany, a genus of plants whose flower is papilionaceous. For the medicinal virtues and propagation of liquorice; see **LIQUORICE**.

**GLYPH**, in sculpture and architecture, denotes any canal or cavity, used as an ornament.

**GMELINA**, in botany, a genus of plants whose flower is monopetalous and ringent, with a quadrifid border. The fruit is an unilocular globose drupe, including a smooth, ovate, bilocular nut.

**GNAPHALIUM**, cudweed, in botany, a genus of plants whose flower is compounded of hermaphrodite and female florets. The hermaphrodite are funnel-shaped, and form the disk. The female florets are placed on the verge. Cudweed is esteemed drying and astringent, and stands recommended in dysenteries, hæmorrhages, and all kinds of fluxes.

**GNOME** is often used in a synonymous sense with apophthegm. See **APOPTHHEGM**.

**GNOMES**, *Gnomi*, certain invisible people, who, according to the Cabbalists, inhabit the inner parts of the earth. They are supposed small in stature, and the guardians of quarries, mines, &c. See **CABBALISTS**.

**GNOMON**, in dialling, is the style or pin of a dial, whose shadow serves to point out the hour.

The word is Greek, and derived from γνωμων, which imports somewhat that makes known; because the style indicates the hour. The gnomon of every dial is supposed to represent the axis of the world, and therefore the two ends or extremities thereof must answer to the north and south poles.

**GNOMON**, in geometry. If a parallelogram be divided into four less ones by two right lines drawn respectively parallel to the sides thereof, and one of these parallelograms be retrenched or taken away; the remaining three will form a gnomon.

**GNOMON**, in astronomy, a pillar, &c. erected to find meridian altitudes of the sun and stars by its shadow.

**GNOMONICKS**, *Gnomonica*, the art of dialling, or of drawing sun and moon-dials on any given plane. See **DIAL**.

**GNOSTICKS**, in church-history, christian hereticks so called, it being a name which almost all the ancient hereticks affected to take, to express that new knowledge and extraordinary light to which they made pretensions; the word gnostick signifying a learned or enlightened person.

**GOD**, *Deus*, the supreme, eternal, omniscient and omnipresent self-existing Being; the first cause, or creator of the universe, and the only true object of religious worship.

The Rabbins and Hebraists, particularly St. Jerom and the interpreters, reckon up ten different names of *God* in scripture; which are אל, *El*; אלהים, *Elohim*; אלהי, *Elohe*; צבאות, *Tsebaoth*; צליון, *Elion*; אהיה, *Ehje*; אדוני, *Adonai*; יה, *Jah*; שדי, *Shaddai*; יהוה, *Jehovah*: but it is wrong to divide אלהי from צבאות; they should be but one name אלהי צבאות, *Elohe-tsebaoth*; i. e. *God of hosts*.—Of these names there are three which express the essence of *God*, and are proper names; viz. אהיה, *Ehje*; יה, *Jah*, and יהוה, *Jehovah*: the others are only names of attributes. See **TRINITY**.

**GODS** and **GODDESSES**, the false objects of religious worship among the pagans. Of these there was a prodigious number. Varro reckons up no less than 30,000 adored within a small extent of ground, and yet their number was every day increasing.

**GOD-FATHERS** and **GOD-MOTHERS**, persons who attend at the baptism of infants, or other persons, and give them the name. In the church of England the number is reduced to three, and in that of Rome to two; formerly they had as many as they pleased. The Romanists have god-fathers and god-mothers at confirmation, and they even give them to bells at their baptism. God-father was also applied to a kind of seconds, who attended knights in tournaments and single combats.

The god-fathers of duels were a kind of advocates chosen by both parties, to represent the reasons of their

combat to the judges. The institution of patrini and matrini, or god-fathers and god-mothers, is of Roman original; these being persons who in the games of the Circus attended the chariots, shews, and images of the gods.

**GOLD**, *Aurum*, a yellow metal; being the heaviest, purest, most ductile and shining of any, and consequently the most valuable.

The chymists tell us, that gold is composed of two substances, the one an extremely pure and simple matter of the nature of mercury, and the other which they say fixes or destroys the fluidity of this, an equally pure and simple substance, extremely subtile and of the nature of sulphur.

We are to take all this however upon the credit of those who affirm it; for, by all the trials that have been made, gold seems the most simple of all known substances. Its colour is yellow, it is the most malleable and most ductile of all the metals. It is wholly incapable of rust, and is not sonorous, when struck upon. It requires a strong fire to melt it, remaining unaltered in the degree of heat that fuses tin or lead, but running with a less vehement one than is necessary to the fusing of iron or copper. It does not retain its colour till the time of its melting, but becomes ignited and white before it runs, and, when in fusion, it appears of a pale bluish green colour on the surface.

It amalgamates the most readily of all the metals with quick-silver; when in a state of fusion, it very easily and intimately blends itself with silver, and, when mixt with that metal, will also run into a mass with iron. Either silver or gold may indeed be mixt singly with this metal by fusion, but it is much easier done with regard to gold, when before blended with silver. It much more easily mixes with copper and other metals, and very readily with some of the semi-metals, as with the regulus of antimony. Common fire carried to its utmost vehemence has no further effect on gold than the fusing it; it will remain ever so long in its fiercest heat, and come out at last unaltered and with its whole weight. Exposed to the focus of the strongest burning glasses, it sparkles and flies off in small masses, which, if received on paper and examined afterwards, are found to be pure unaltered gold; but, if that heat be managed very nicely, and the same gold again and again exposed to it, it is affirmed that a part of the gold will at length go off in fumes, and the remainder will be found to be a substance of a deep blue with some admixture of purple, and approaching to the nature of vitriol rather than of gold, of which it wants the malleability and the specific gravity.

Gold is by far the most divisible of all bodies: if melted with a hundred thousand times its weight of silver, it will perfectly and equally blend itself with that metal; any grain of the melted mass, being cut off, will be found on assaying to contain its due and proportionate quantity of the gold in it; and a single drop of a solution of gold in aqua-regia will communicate a metalline taste to a pint of spirit of wine, if mixed with it. Its ductility is in no degree inferior to this quality of it.

The wire-drawers, according to Reaumur, are able to extend a leaf of gold to the twelfth millionth part of an inch in thinness over a flatted silver wire, and yet the silver shall be perfectly so covered in every part with gold, that not only the naked eye, but even the best microscope, shall not be able to find a speck of silver appearing under it.

The specific gravity of gold has been said, by different people who have tried it, to be to that of water, from 19081 to 19640, to 1000; according to the nicest experiments we have been able to make with gold refined to its utmost purity, it is as 19420 to 1000.

The proper solvent of gold is aqua regia; this menstruum owes its power upon the metal to the sea-salt it contains, that being almost the only salt which has the quality of acting upon gold.

The effect of this menstruum affords a test for this metal; if we require another, we may have recourse to a fusion with antimony; for if pure gold and antimony be melted together, the antimony, on keeping up the fire to a great height, will be all driven off in fumes, and will



will leave the gold, if pure, unaltered in weight; whereas, if it contained any mixture of another metal, the antimony would have taken it away with it, not excepting even silver itself.

If a quantity of salt of tartar, or any other fixed alkali, be thrown into a solution of gold, the metal is precipitated in form of a powder, which has an explosive power greater than that of gun-powder, or the pulvis fulminans of the chymists. This powder is called, for its property, aurum fulminans.

Gold is generally found in the earth, native and not debased in the state of ore, but under its own proper form, yellow, malleable and ductile. In this state, however, it is seldom quite pure, but usually contains some copper, and almost always some silver among it. Native gold, thus mixed with small quantities of the other metals, is found sometimes in small granules among the sands of rivers, sometimes in larger masses loose and alone, or else mixed among a redish or whitish marle in the fissures of rocks. But its most usual form of all is that in which we see it, in what is vulgarly, though very improperly, called gold ore; that is, in masses of a whitish opaque stone, approaching to the nature of a crystal, in which the native gold is deposited in the form of drops and threads, and sometimes of veins. The gold in this stone has a thousand various and beautiful appearances, and the stone itself is occasionally tinged with black, green, and other colours.

There are also coarser stones of various kinds and colours, in which gold is dispersed in this manner, all which are beautiful enough, but less so than in this purer kind; these are of all colours, but most frequently they are whitish or redish. In all these ores, as they are called, the gold shews itself in its proper form: but there are some metalline substances found in which this metal is truly reduced to the state of ore, that is, in which it is not yellow, malleable or ductile, but reduced to a discoloured and brittle mass, by being penetrated with sulphur or arsenick, and by them reduced, like the other metals, to that state which is properly called ore; these being the two substances which nature employs to debase the other metals into that state. Whenever gold is found thus penetrated and altered, there is always silver with it in the same mass, and the ores are properly silver ores, or those of some other metal in which some silver is also contained, the gold being always in the smallest quantity of any metal in the mass.

Among the number of gold ores, we are also to reckon lapis-lazuli, some pieces of which, besides the glittering gold-coloured marcasite that abounds in them and forms their yellow veins, contains also a small quantity of gold. Common sand and clay may also be reckoned among the ores of gold, as there are few kinds of either from which some gold may not be extracted by a skilful hand, though not enough to pay the expence of working. Orpiment has also been worked near two thousand years ago for gold, and a small quantity obtained from it, but not enough to make it worth while to continue the works; and finally some of our common marcasites contain a little of it. The colour of our yellow marcasites has tempted many to believe them almost all gold; but such people may be easily undeceived, by only calcining the substances they suppose so rich, in a common fire; in which case they do not retain their yellow colour, as gold would do, but become red.

Gold resisting the action of lead, or glass of lead, and sustaining the copel and the test in which other metals, silver alone excepted, turn to scoriae, is easily separated from its ore, as well that which is properly as that which is improperly so called, by the common method of testing and copelling.

When in its native state, it is also very conveniently separated by amalgamation with mercury, as it more readily mixes with that body than silver itself does; but this method is of no use where the gold is truly reduced to a state of ore, as nothing but a pure metal is capable of amalgamation.

The ready method of separating the gold from its ore by the copel, is to mix a quantity of it in fine powder, with eight times its weight of granulated lead, and putting it into a test, in which keep it red-hot till the scoriae

on the surface are perfectly vitrified. After this the lead with the gold, separated from this stony and other particles, and mixed with it, is to be put into a copel and kept in the fire together till all the lead is burnt away into litharge and scoriae, and the gold remains alone in the copel. When the ore is mixed with other substances besides stones, or earths, as pyrites and the like, a little glass of lead is to be added, which makes them run thin and more easily deposit the metal by precipitation. These methods will succeed when gold is truly in a state of ore; but when it retains its metallick form, though mixed with stones and the like, the short way is that by amalgamation. The method for this is to powder the ore, then wash away the lighter and fouler part, infuse the rest in strong vinegar with a little alum dissolved in it; and afterwards, pouring off the vinegar and washing the ore with water, it is to be dried, and then rubbed in a mortar with four times its weight of mercury, till all the gold be taken up by the mercury; as much of the loose mercury as possible is then to be separated by straining the whole through a cloth, squeezing it well, and after this the remainder of it is to be separated by distillation, or evaporation, and the metal left behind it to be fused with borax, till it is quite pure.

When there is gold and silver together in the remaining mass of metal, after any of the operations, they are to be separated by putting the whole into aqua regia, and when the menstruum has dissolved all the gold, it is to be evaporated away, and the gold remaining at the bottom to be melted in a crucible with borax: the silver remaining undissolved by the menstruum is to be melted in another, and both will be pure and in their proper form. Finally, gold mixed in a regulus with any of the other metals, is readily separated from them by fusing the whole with three or four times the weight of glass or lead.

It is to be observed, that aqua regia, though the general and common solvent of gold, is not the only one: Kunkel long since discovered, that it might be dissolved by the fumes arising from a mixture of oil of tartar and oil of vitriol, and a menstruum in the common liquid form may be produced from these, which will have the same power. Mercury also is a true solvent of this metal by amalgamation: and the hepar sulphuris, or liver of sulphur, on being fused with it, takes it up so perfectly, that it will be carried into a lac sulphuris by the common processes afterwards with it, without any separation either in the solution or precipitation.

**GOLD WIRE**, a cylindrical ingot of silver, superficially gilt, or covered with gold at the fire, and afterwards drawn successively through a great number of little round holes, of a wire-drawing iron, each less than the other, till it be sometimes no bigger than a hair of the head. See the article **WIRE**.

**GOLD-WIRE flatted**, is the former wire flatted between two rollers of polished steel, to fit it to be spun on a stick, or to be used flat, as it is without spinning, in certain stuffs, laces, embroideries, &c. See **STUFF**, &c.

**GOLD THREAD**, or **SPUN GOLD**, is a flatted gold, wrapped or laid over a thread of silk, by twisting it with a wheel and iron bobbins.

**GOLD LEAF**, or **BEATEN GOLD**, is gold beaten with a hammer into exceeding thin leaves, so that it is computed, that an ounce may be beaten into sixteen hundred leaves, each three inches square, in which state it takes up more than 159052 times its former surface.

This gold they beat on a block of blade marble, about a foot square, and usually raised three feet high: they make use of three sorts of hammers, formed like mallets, of polished iron: the first, which weighs three or four pounds, serves to chafe, or drive: the second, of eleven or twelve pounds, to close; and the third, which weighs 14 pounds to stretch and finish. They also make use of four moulds of different sizes; viz. two of vellum, the smallest whereof consists of 40 or 50 leaves, and the larger of 200: the other two, consisting each of 500 leaves, are made of bullocks guts well scoured and prepared.

**GOLD-FINCH**, in ornithology, the English name of a species of fringilla, with the wings variegated with black, yellow, and white.



**GOLD SIZE.** See the article **SIZE**.

**GOLD-SMITH**, or as some choose to express it, silver-smith, an artist who makes vessels, utensils, and ornaments in gold and silver.

**Shell-GOLD**, that used by the illuminers, and wherewithal we write gold letters. It is made of the parings of leaf-gold, and even of the leaves themselves, reduced into an impalpable powder, by grinding on a marble with honey. After leaving it to infuse some time in aquafortis, they put it in shells, where it sticks. To use it they dilute it with gum-water, or soap-water.

**GOLDEN**, something that has relation to gold, or consists of gold, is valuable, or the like; as,

**GOLDEN-BULL.** See the article **BULL**.

**GOLDEN-CALF**, in Jewish antiquity, a figure which the Israelites cast in gold, and set up in the wilderness to worship, during Moses's absence in the mount, and which that legislator, at his return, burnt, ground to powder, and mixed with the water the people were to drink of; as in Exod. xxxii.

**GOLDEN NUMBER**, in chronology, a number shewing what year of the moon's cycle any given year is. See **CYCLE of the Moon**.

**GOLDEN RULE**, in arithmetick, is also called the rule of three, and the rule of proportion. See the article **PROPORTION**.

**GOLPS**, in heraldry, are roundles of a purple tincture, called by the French *torteau*, adding their peculiar colours.

**GOMPHOSIS**, in anatomy, a species of articulation, wherein one bone is set in the other, like a nail or peg; as the teeth within the jaws.

**GONDOLA**, a sort of barge curiously ornamented, and navigated in the canals of Venice. See **BARGE**.

**GONORRHOEA**, in medicine, an involuntary efflux of the feminal juices, and some other recrementitious matter. A gonorrhœa is either of a mild and benign, or malignant kind: in the former is discharged a whitish liquor, without pain, heat, or exulceration, nearly resembling the *fluor albus*. The virulent kind consists in a discharge of matter of various kinds, accompanied with heat and exulceration, and generally attended with a pain in discharging the urine, which in some patients is of an acrimonious quality, as also with an uncommon loss of strength.

In the beginning of a gonorrhœa, bleeding more or less, according to the virulence of the inflammatory symptoms, is to be used; and, where these are very severe, this is to be repeated as often as in a peripneumony.

Let the patient drink ptisan made of emollient and refrigerating herbs, together with crystal mineral, or sal prunellæ; and if the belly be not open enough, a clyster of the same ptisan every day, either alone or with a little vinegar, sal prunellæ, or pulp of cassia may be taken.

Where the inflammation is not hereby mitigated, a large draught of the emulsion of the seeds of melon, agnus castus, hemp, white poppy, or linseed, prepared with the decoction of the flowers of water-lily, adding thereto a sufficient quantity of the syrup of water-lily, may be used every morning and evening; and when the symptoms are very violent, he recommends an opiate, dissolved in both doses of the emulsion, especially that in the evening.

Where the dysury and inflammatory symptoms are very severe, fomentations of milk for the genital parts will be of great service, and emollient cataplasms are to be applied to the peritonæum, and emollient and cooling injections to be used.

**GOOD**, or *Goodness*, whatever tends to preserve or perfect human nature, in opposition to evil that destroys or impairs it.

**Metaphysical GOOD**, or absolute or real good and good per se, the essential perfection of a thing, whereby it possesses every thing requisite to its nature.

**Physical or Natural GOOD**, that whereby a thing possesses whatever is natural to its well-being, and the performance of all its functions. Besides absolute physical goodness, there may be a relative one, as in foods, which to one man are salutary, to another poison, &c.

**Moral or Ethical GOOD**, the conformity of a think-

ing being, and all its acts and dispositions with the dictates of right reason, and the will of the Deity, as discovered by the light of nature. So that a thing done, &c. must not only be, but it must be done, &c. from good principles and to good ends.

Others define moral or relative good to be something that tends to the good and perfection of another; and so divide it into three kind, *honestum*, *jucundum*, and *utile*.

**GOOD**, *abearing* or *Behaviour*, *bonus Gestus*, in law, denotes the exact behaviour of a subject towards the king and his lieges.

**GOODS**, *Bona*, in law, include all kinds of effects, lands, possessions, &c. moveable or immoveable. They are also divided into proper, paternal, patrimonial, and hereditary, into acquired or accquests; and, thirdly, conquests, &c.

**GOOGINGS**, in ship-building, certain plates of iron bolted to the stern-post of a ship, to receive and keep steady the rudder. There are four or five of them on the stern-post, having a large hole in each, into which certain spindles, called pintles, are introduced, upon which the rudder rests, as upon an axis. See the article **RUDDER**.

**GOOSE**, *Anser*, in ornithology, a well-known bird of the *anas* kind, with the back of a greyish brown colour, and the belly and edges of the wing-feathers white.

**GOOSEBERRY**, *Grossularia*, in botany, a genus of plants of the shrub kind; its characters are, it hath a woody root; the branches when full grown are of a dark purple colour, armed with sharp thorns at the rise of the leaves, which have short pedicles, and are lacinated like those of the currant or vine, but less; the flowers are like those of the currant, with which Linnaeus classes them, under the general names *ribes*; but as they differ much both in their appearance and also their fruit, which in this grow not in bunches, it may here be thought proper to separate them as distinct genera. There are several sorts of gooseberries propagated in gardens, as the amber gooseberry, red hairy gooseberry, large Dutch gooseberry, green gooseberry, red smooth gooseberry, with some other varieties; they are all propagated by cuttings, suckers, or from seeds, though best from cuttings, which may be taken off in autumn or spring; they are managed much the same as the currant both in planting and pruning, excepting that the extremities are commonly left in pruning.

**GOOSE-NECK**, among sailors, a sort of hook fixed in the inner end of a boom, or pole, to extend the bottom of some of the sails of a ship, particularly the main boom of a brig or sloop, and the lower-studding-sail booms of ships and larger vessels. See **BOOM**.

The goose-neck is hooked in a ring or eye-bolt of iron, and may be occasionally unhooked at pleasure.

**GOOSE-WINGS of a Sail**, the clues, or lower corners of a ship's main-sail or fore-sail, when the middle part is tied up or furled to the yard. The goose-wings are only used in a great storm to scud under, when the sail at large, or even reefed, would be too much for the ship to carry at such a time.

**GORE**, in heraldry, one of the abatements which, according to Guillim, denotes a coward. It is a figure consisting of two arch lines drawn one from the sinister chief, and the other from the sinister base, both meeting in an acute angle in the middle of the fess point.

**GORE**, in law, signifies a narrow slip of ground.

**GORGE**, *Gula*, in architecture, the narrowest part of the Tuscan and Dorick capitals, lying between the astragal, above the shaft of the pillar and the annulets. See **Tuscan** and **Dorick Order**.

It is also used for a concave moulding, larger, but not so deep as the scotia, which serves for compartments, &c. See **COMPARTMENT**.

**GORGE**, in fortification, the entrance of the platform of any work. In all the outworks, the gorge is the interval betwixt the wings on the side of the great ditch, as the gorge of a ravelin, half-moon, &c. These, it is to be observed, are all destitute of parapets; because, if there were any, the besiegers, having taken possession of the work, might use it to defend themselves



felves from the shot of the place; which is the reason that they are only fortified with pallifadoes, to prevent a surprize.

The gorge of a bastion is nothing else but the prolongation of the curtains from their angle with the flanks, to the centre of the bastion where they meet. When the bastion is flat, the gorge is a right line, which terminates the distance between the two flanks. See **BASTION** and **FORTIFICATION**.

**GORGED**, in heraldry, the bearing of a crown, coronet, or the like, about the neck of a lion or swan, and in that case it is said, the lion or cygnet is gorged with a ducal coronet, &c. Gorged is also used when the gorge, or neck of a peacock, swan, or the like bird, is of a different colour or metal from the rest.

**GORGED**, among farriers, &c. signifies the same as swelled; in which sense they say, the legs of a horse are gorged; the pastern joint is gorged; you must walk him out to disgorge his shoulder.

**GORGERIN**, in architecture, the same with gorge. See the article **GORGE**.

**GORGONS**, in antiquity, a warlike female nation of Lybia, in Africa, who had frequent quarrels with another nation of the same sex, called Amazons.

**GOSHAWK**, the English name of a yellow-legged falcon, with a brown back, and a white variegated breast.

**GOSPEL**, the history of the life, actions, death, resurrection, ascension, and doctrine of Jesus Christ. This history is contained in the writings of St. Matthew, St. Mark, St. Luke, and St. John; who from thence are called evangelists. The Christian church never acknowledged any more than these four gospels as canonical; notwithstanding which, several apocryphal gospels are handed down to us, and others are entirely lost.

**GOSSYPIMUM**, cotton, in botany, a genus of plants whose flower consists of five plane patent petals, growing together at their bases, and vertically cordated; the stamina are numerous, and joined in a column, and the fruit is a roundish capsule containing four cells, which encloses a number of oval seeds, surrounded with a downy matter called cotton. See **COTTON**.

**GOTHICK**, in general, whatever has any relation to the Goths: thus we say, Gothick customs, Gothick architecture, &c. Gothick architecture is far removed from the manner and proportions of the antique; having its ornaments wild and chimerical, and its profiles incorrect: however, it is frequently found very strong, and appears very rich and pompous, as may be seen in several of our English cathedrals. This manner of building was, originally, very heavy and coarse; but is since run into the opposite extreme, being slender, rich, and delicate to a fault. In the Gothick architecture we see high vaults raised on slender pillars; and every thing crowded with windows, roses, crosses, figures, &c.

**GOVERNMENT**, in general, is the polity of a state, or an orderly power constituted for the publick good.

**GOVERNMENT** is also a post or office which gives a person the power or right to govern or rule over a place, a city, or province, either supremely or by deputation.

**GOVERNMENT** is also used for the city, country, or place to which the power of governing is extended.

**GOVERNMENT**, in grammar, a part of construction usually called regimen.

**GOUGE**, an instrument or tool used by divers artificers; being a sort of round hollow chissel, for cutting holes, channels, grooves, &c. either in wood or stone.

**GOURD**, *Cucurbita*, in botany. See **CUCURBITA**.

**GOUT**, *Arthritis*, in medicine, as defined by Boerhaave, a very painful disease, whose seat is in the joints and ligaments of the feet, and whose principal times of invasion are the spring and autumn. The curative intention, according to Wintringham, requires, first, that the primæ viæ be set free from a load of indigested crudities, and the viscera be restored to their pristine vigour; secondly, that the fluid stagnating in, and stuffing up the smaller vessels, may be expelled the body, and a free passage through the contracted vessels

be restored. The first intention may be answered by vomits and gentle catharticks repeated as occasion requires; by bitters, aromatics, antiscorbutick medicines; by alkaline fixed salts, taken in small quantities for a time; by aliments and drinks that are nourishing, light, easy of digestion, quickly assimilated, and taken in due quantity; by powerful exercise often repeated, and long continued; and especially by riding in a dry, serene, pure air; by frictions; by motion of the affected parts; by going to sleep at early hours. The second intention may be answered partly by the preceding, as well as by procuring gentle sweats; by bathing in natural and artificial baths; by sweating in a bagnio; or by the use of volatile salts, and copious drinking of attenuating liquors, actually hot, in the morning while in bed, in order to procure a sweat; as also by mercurial purges, taking a large quantity of diluents after them; by frictions of the whole body, especially the parts affected, with hot, dry, linen cloths, till a redness appear; by cold baths, and the like.

To abate the excessive pain in the part affected, Boerhaave says, that if there be an absolute necessity, opiates may be given internally, and the patient may drink plentifully of hot whey, or any other liquor of the like nature. Externally emollients and anodynes may be used, laid on pretty hot; or the part affected may be heated with nettles; or it may be anointed with terebinthinated balsam of sulphur; or tow may be burnt thereon.

**GOUT-WORT**, in botany, a term sometimes used for angelica. See **ANGELICA**.

**GOUTY-LAND**, among farmers, denotes a moorish, cold, and black soil, abounding with springs. In Staffordshire, this sort of land is ordered much in the same manner as heathy land, only that it is usually burnt deeper. It bears little besides oats, white oats upon the gouty, and black oats upon the black cold land. The turf of these grounds burnt, and carried upon rye or barley lands, is esteemed a better improvement than dung.

**GRACE**, *Gratia*, among divines, signifies any unmerited gift which God bestows on mankind.

*Act of GRACE*, an act of parliament for a general and free pardon, and for setting at liberty insolvent debtors.

**GRACES**, in heathen mythology, three goddesses, whose names were Aglia, Thalia, and Euphrosyne; that is, shining, flourishing, and gay; or, according to some authors, Pasithea, Euphrosyne, and Ægiale. Some make them the daughters of Jupiter and Eurynome, or Eunomia, the daughter of Oceanus; but the most common opinion is, that they were the daughters of Bacchus and Venus.

**GRACILIS**, in anatomy, a muscle of the leg, so called from its slenderness: it arises from the synchondrosis of the os pubis.

**GRADATION**, in general, the ascending step by step, or in a regular and uniform manner.

**GRADATION**, in architecture, a flight of steps, particularly ascending from the cloister of the choir in churches.

It also denotes an artful disposition of several parts, as it were by steps and degrees, after the manner of an amphitheatre; so that those placed before, are rather serviceable than the contrary to those behind.

**GRADATION**, in painting, a gradual and insensible change of colour, by the diminution of the teints and shades.

**GRADATION** in rhetorick, the same with climax. See **CLIMAX**.

**GRAFT**, or **GRAFF**, in gardening, a cion or shoot of a tree inserted into another, so as to make it yield fruit of the same nature with that of the tree from whence the graft was taken.

**GRAFTING**, or **ENGRAFTING**, is the taking a shoot from one tree and inserting it into another, in such a manner, that both may unite and form one tree.

*General directions for GRAFTING*. All such trees as are of the same genus, i. e. which agree in their flower and fruit, will take upon each other; for instance, all nut-bearing trees may be safely grafted on each other;



as may also the plum-bearing trees, under which head we reckon not only the several sorts of plums, but also the almond, peach, nectarine, apricot, &c. which agree exactly in their general characters by which they are distinguished from all other trees: but many of these are very subject to emit large quantities of gum from such parts of the trees as are deeply cut and wounded, which, in the tender trees of this kind, viz. peaches and nectarines, being more common and hurtful, it is found to be the surest method to bud or inoculate them. See INOCULATION.

All such trees as bear cones will do well upon each other, though they may differ in one being ever-green, and the other shedding its leaves in winter; as is observable in the cedar of Libanus, and the larch-tree, which are found to succeed upon each other very well: but these must be grafted by approach; for they abound with a great quantity of resin, which is apt to evaporate from the graft, if separated from the tree before it be joined with the stock, whereby they are often destroyed; as also the laurel on the cherry, or the cherry on the laurel. All the mast-bearing trees will also take upon each other, and those which have a tender soft wood, will do well if grafted in the common way; but those of a more firm contexture, and that are slow growers, should be grafted by approach.

By strictly observing this rule we shall seldom miscarry, provided the operation be rightly performed and at a proper season, unless the weather should prove very bad. It is by this method that many kinds of exotick trees are not only propagated, but also rendered hardy enough to endure the cold of our climate in the open air; for being grafted upon stocks of the same sort that are hardy, the grafts are rendered more capable of enduring the cold; as has been experienced in most of our valuable fruits now in England, which were formerly transplanted hither from more southerly climates.

*Tools and Materials necessary for GRAFTING.* The tools necessary for this operation, are a small hand-saw, to cut off the heads of large stocks; a good strong knife with a thick back, to make clefts in the stocks; a sharp pen-knife to cut the grafts; a grafting chissel, and a small mallet; bafs strings or woollen yarn; and a quantity of clay, which should be prepared a month before it is used, in the following manner: get some strong, fat loam; then take some new stone-horse dung, and break it in amongst the loam; if you cut a little straw or hay very small, and mix amongst it, the loam will hold together the better; and if there be a quantity of salt added, it will prevent the clay from dividing in dry weather; this compound should be well stirred together, and water put to it in the manner of making mortar; after which it should be moistened afresh, and stirred every other day; but it ought to be remembered, that it should not be exposed to the frosts, or to drying winds.

Of late years, some have made use of another composition for grafting, which they have found to answer the intention of keeping out the air, better than the clay just prescribed. This is composed of turpentine, bees-wax, and rosin, melted together, which when of a proper consistence, may be put on the stock round the graft, in the same manner as the clay is usually applied; and though it be not above a quarter of an inch thick, yet it will keep out the air more effectually than clay; and as cold will harden it, there is no danger of its being hurt by frost, which very often cleaves the clay; by which means it frequently drops off; when the heat of the summer comes on, the mixture will melt and fall off without any trouble; but you must be careful not to apply it too hot, lest you injure, if not destroy the graft.

*Methods of GRAFTING.* There are various methods of grafting; but the following will be sufficient to explain the manner of performing the operation; which is done about the latter end of March, or the beginning of April.

The top of the stock is cut off in a smooth, straight place; then the cion or graft is prepared, by cutting it on one side from the joint or seam, down slopewise, making the slope about one inch, or an inch and an half long; and observing it is bent so that the cion may stand

nearly upright when it is fixed to the stock. At the top of the slope a shoulder, is made, whereby it is to rest on the crown of the stock. The whole slope must be plain and smooth, that it may lie even to the side of the stock. The length of the cion used here may be about four inches from the shoulder, for a standard tree; but for a dwarf, or wall tree, it may be six inches. When the cion is prepared, the outside of its sloped end, from the shoulder downwards, is applied to the west, or south-west side of the stock, and its length and breadth measured thereon; which done, the bark of the stock (but not any of its wood) is cut away to those dimensions, that the cut part of the cion may be fitted in as exactly as possible. In doing this, regard must be had to the bigness of the stock, and the thickness of its bark, in order to proportion thereto the length and breadth of the cut part of the cion; otherwise the passages of the sap in the stock and cion will not meet, and the cion will then of course perish. When the cut part of the cion is exactly fitted to and laid on that of the stock, they are bound together with woollen yarn, and covered with clay, an inch above, and as far below the head of the stock; working it round the cion till it becomes sharp at top, that the rain may run down it.

*Whip-GRAFTING, or Tongue-GRAFTING,* is proper for small stocks, from an inch diameter to a quarter of an inch, or even less. Mr. Worlidge, Mr. Loudon, Mr. Miller, and others, speak of it as the most effectual way of any, and that which is most in use, because the cion covers the stock much sooner in this method than in any other; for here the cion and stock must always be of the same thickness. There are three ways of performing it, and all of them may be practised somewhat later than either of the foregoing.

The first is, to slope the cion off a full inch, or more; then to do the same to the stock; and afterwards to tie the one to the other, with bafs or yarn, so as to join them closely at every part, but particularly at the rind; and then to cover the joint carefully with well-tempered clay. The bafs used for this, or for any other binding, should be taken from a sound mat, and be soaked in water for some hours, to increase its strength, and render it the more pliable.

The second way is, to make a shoulder in the graft, and, the head of the stock being cut off and smoothed, to join it.

The third method, which is an improvement of the last, is properly named tipping or tonguing. This is done by cutting the stock off slaunting, as before, and leaving at its upper side a thin piece, or tongue, as it is called, of the wood, pared away like the lower end of a coin. The cion is then sloped and tongued, in the same manner as the stock, and a slit is made in each of them, downward in the stock, and upward in the graft, on the side opposite to the tongue, so that each may receive the tongue of the other. The cion is then joined to the stock, as closely as can be, particularly at the bark; a ligature is made round them with bafs or woollen yarn, and the engrafted part is well covered with clay or cement.

*Root-GRAFTING,* is a modern invention, the design of which is somewhat different from that of any of the former methods: this being for the propagation or multiplication of plants already fitted to produce their fruit.

To perform this, take a graft or sprig of a young tree, which you intend to propagate, and a small piece of the root of another tree of the same kind, or of a like genus, and whip-graft them together; observing that the rind of the root join closely to that of the graft. These may, afterwards, be planted out at pleasure, and the piece of root will collect the nutritive juices, and feed the graft, as the stock does the other way.

This method of propagation is very easy and expeditious; roots being more plentiful than stocks: by this means the pieces or roots of one crab-stock, for example, or of one apple-stock, will serve for twenty or thirty apple-grafts; and the like of other trees. It is also an excellent way for raising such trees, which will hardly bear being grafted in the stock. Add, that trees thus grafted bear sooner, and are more easily dwarfed than any other way.



The only objection against this method is, that the young tree grows but slowly at first, which is occasioned by the smallness of the root that feeds the graft; for in all trees the head must follow the increase of the roots, from whence it hath its nourishment.

*Reiterated GRAFTING, or GRAFTING by a double or triple Incision*, is a method mentioned by Agricola, whose work, though chimerical enough in many respects, contains, notwithstanding, several very good things. To perform this, first graft a good cion on the stock, and cut it away to one-half, or a third part; then fix to that remaining part of the cion, another graft of a better kind; and to that a third; for the oftener the tree is grafted, the finer fruit it produces.

By this method, the author above-mentioned assures us, that he produced muscat-pears, which were admirable, making at first use of a stock grafted with a pound-pear, on which he grafted a summer bon-cretien; and when the branch of this last had shot, he grafted on it a cion of a bergamo, which he also cut, and grafted on it a cion of a muscat-pear.

*GRAFTING by Approach*, called also *Inarching*, and *Ablatation*, is used only when the tree intended to be grafted, and that from which the graft is to be taken, stand so near, or can be brought so near to each other, that they may be joined together. The method of performing it is thus: the branch to be inarched is fitted to that part of the stock where it is to be joined; the rind, and part of the wood of one side of that branch, is then pared away very smooth and even for the length of three inches; and afterwards the other branch, which is to serve for the stock to which the graft is to be united, is served in the same manner, so that the two may join closely and equally together, that the sap-vessels may meet. A little tongue is then cut upwards in the graft, and a slit is made in the stock to receive it; so that when they are joined, the tongue prevents their slipping, and the graft is the more closely united to the stock. When they are thus placed exactly together, they must be tied with bafs, worsted or some other soft thing; and the place of junction must be well covered over with grafting-clay, to prevent the air from drying the wound, and the wet from rotting the stock. A stake must also be fixed in the ground, and both the stock and the graft must be tied thereto, to prevent their being displaced by the wind. When they have remained in this state four months, they will be sufficiently united, and the graft may then be cut off from the mother tree, observing to slope it close to the stock. It is of great service to the graft then to lay a fresh coat of clay all round the grafted or jointed part. This operation should be performed in April or May, that the graft may be perfectly united to the stock, before the ensuing winter. This method was more practised formerly than at present, on orange-trees, jasmines, &c. but as there are better ways to manage them, either by cuttings or inoculation, inarching is therefore little used, but on those sorts of plants which are of a firm contexture and slow growth, which will not take otherwise.

All grafts, particularly of young cions, are subject to be injured by birds; but that may be prevented, by binding some small bushes about the tops of the stocks. The binding of grafts should be loosened when the cions have pushed forth about an inch and an half, or two inches; for if it is continued longer, its too great tightness will hinder the swelling of the stock, so as to hazard the cion being broke by the winds at the place of the bandage: as a substitute in this case, if the cion is so ordered in cutting, that an eye be left against the place of junction, between the stock and graft, there is a probability of the bud putting forth after the damage has so happened, provided it is broke off above it, and thereby a year is gained.

**GRAIN**, a general name for all sorts of corn, as wheat, barley, &c.

**GRAIN** is also the name of a small weight, the 20th part of a scruple in apothecaries weight, and the 20th of a penny-weight troy.

**GRAIN** also denotes the component particles of stones and metals, the veins of wood, &c.

**GRAINING Board**, a board used by the carriers to

give a grain to their leather. It consists of notches quite across; into which the pliant leather being pressed, its surface readily takes the impression.

**GRAMINEA**, in antiquity, a kind of crown made of grass, *Corona Graminea*, bestowed by the Romans on such of their generals as had saved and rescued an army, and put the enemy to flight.

**GRAMINEOUS Plants**, in botany, such as have a long leaf, and no foot-stalk.

**GRAMMAR**, the art of writing and speaking a language with propriety.

**GRAMMAR** also denotes a book that contains the rules of grammar in any language.

**GRAMMARIAN**, *Grammaticus*, one well versed in grammar, and capable of teaching it.

**GRAMMATICAL**, any thing relating to grammar.

**GRANADIER**, *Grenadier*. In every regiment of foot there is a company of granadiers, who are generally armed and accoutred as the rest of the regiment, only they are taller men, and wear high caps. In detachments, mounting of guards, &c. and when the whole battalion is drawn out, they are always on the right, and are the first in attacks.

**GRANADO**, or *Granada*, in the art of war, a hollow shell of iron, &c. filled with gunpowder, to which a fuzee is fitted to set fire to it.

**GRANATUS**, the garnet. See **GARNET**.

**GRAND**, a term borrowed from the French, and signifying the same with great.

**GRANARY**, a building for laying up, and preserving corn.

**GRAND-JURY**, the jury who find the bills of indictment at the assizes, or sessions of the peace.

**GRANGE**, a house or farm furnished with granaries and barns for holding corn, stables for horses, stalls for cattle, &c.

**GRANIFEROUS Pops**, among botanists, are such as contain small seeds resembling grain.

**GRANITE**, *Granite*, *Granites*, a very hard rough kind of marble, that will not take a thorough polish; so denominated, as being sprinkled over with a great many little stains that resemble grains of sand. There are three kinds of it; that of Egypt, with greenish spots on a dirty white ground, chiefly used in their obelisks and catacombs, some of which are above 40 feet high. The granite of Italy is softer in the quarry than that of Egypt. The granite of Dauphiny, which is only a very hard sort of flint. There is likewise a green sort of granite, which is a species of serpentine, variegated with white and green specks.

**GRANIVOROUS**, an epithet applied to such animals as feed upon any grain or seeds, particularly birds, who have a peculiar organ of digestion for that purpose.

**GRANT**, in law, a gift in writing of something incorporeal, or a gift made by such as can only give by deed, as the king and all bodies politick. He that granteth is called granter, and the person to whom the grant is made, grantee.

**GRANULATION**, in chymistry, an operation whereby metals, &c. are reduced into small grains. It is performed by casting the metal, when fused, through a cullender or birchen broom, into cold water in which they become granulated, and thereby are rendered more easy to be dissolved.

**GRAPHOMETER**, a mathematical instrument used by surveyors, and generally called a semicircle. See **SEMICIRCLE**.

**GRAPNELS**, a sort of anchors with four flocks, serving to ride a boat by. There are also fire and chain grapnels, made with four barbed claws instead of flocks, fixed at the yard arm of a fireship, to grapple her adversary.

**GRASS**, *Gramen*, in botany, a general name for most of the herbaceous plants, used as the food of cattle. The best season for sowing grass-seed is the latter end of August and the beginning of September; that the grass may be well rooted before the frost sets in, which is apt to turn the plants out of the ground when not well rooted. This seed should be sown in moist weather, or when there is a prospect of showers; but where this cannot be performed in autumn, the seeds may be sown in the



the spring, about the latter end of March, if the season proves favourable. Some people mix clover and rye-grass seeds together, allowing ten pounds of clover and one bushel of rye-grass to an acre: but this is only to be done where the land is designed to remain but three or four years in pasture, because neither of these kinds are of long duration; so that where the land is designed to be laid down for many years, it will be proper to sow with the grass-seeds some white trefoil, or Dutch clover, which is an abiding plant, and spreads close to the surface of the ground, sending forth roots at every joint, and makes the closest sward of any, and is the sweetest food for cattle: six or eight pounds of this seed should always be sown upon each acre.

The land on which grass-feed is intended to be sown, should be well plowed, and cleared from the roots of noxious weeds, such as couch-grass, fern, rushes, heath, gorse, broom, rest-harrow, &c. which if left in the ground, will soon get the better of the grass, and overrun the land. Therefore, where any of these weeds abound, it will be a good method to plow up the surface in April, and let it lie some time to dry; then lay it in small heaps, and burn it: the ashes so produced will be a good manure for it. But where couch-grass, fern, or rest-harrow grow thick, and their roots run far underground, the land should be plowed two or three times pretty deep in dry weather, and the roots carefully harrowed off after each plowing, which is the most certain method of destroying them.

Before the seed is sown, the surface of the ground should be made level and fine, otherwise the seed will be buried unequally. The quantity of grass-feed for an acre of land, is usually three bushels, if the seed is clean; otherwise a much greater quantity must be allowed: when the seed is sown it must be gently harrowed in, and the ground rolled with a wooden roller, which will make the surface even, and prevent the feeds being blown in patches. If, when the grass comes up, there should be any bare spots where the seed has not grown, they may be sown again, and the ground rolled, which will fix the feeds, and the first kindly showers will bring up the grass. If any thistles, ragwort, or such other troublesome weeds in the following spring come up among the grass, they should be carefully cut up with a spaddle before they grow too large; and this should be repeated two or three times in the summer, which will effectually destroy them.

GRASS-PLATS, in gardening, are made either by sowing of hay seed, or laying of green sods. For the first, chuse seed from the finest upland pastures, after sifting it well. For the second, the turf should be cut on a green, common, &c. where the grass is short and fine; if there be any knobs on the place, before it be cut, roll it after a shower. The turf is cut in squares, marked with lines, raised with a knife and rolled up, about three inches thick. The quarters are to be prepared with a coat of poor earth to lay the turf on; and, after laying, it must be well watered, rolled, &c. To sow grass, the ground must be first dug, then dressed and raked even, and covered an inch thick with good mould. Then sow the seed pretty thick; lastly, rake and cover it. The best season for doing it is in August; after it is well come up, it must be often mowed and rolled from time to time.

GRAVE, in musick, a sound, which is in a low deep tune. The thicker the string, the more grave the note; and the notes are supposed to be the more grave, in proportion as the vibrations of the chord are less quick.

GRAVE, in grammar, an accent opposite to acute, and is expressed thus ('), shewing that the voice is to be depressed, and the syllable pronounced in a deep tone.

GRAVEL, in natural history, is a congeries of small pebbles, which, being mixed with a stiff loam, makes lasting and elegant walks in our gardens. Opinions, with regard to the choice of gravel, are various; some are for having it as white as possible, and in order to render it the more so, cause the walks to be often rolled with stone rollers, which add a whiteness to the surface. But this renders them very troublesome to the eyes, by reflecting too strongly the rays of light: such gravel, therefore, as will lie smooth and reflect the

least, should be preferred. Again, some screen the gravel too fine, but this is an error; for if it be cast into a round heap, and the great stones only are raked off, it will be the better. There are many kinds of gravel which do not bind, and by this means cause a continual trouble of rolling, to little or no purpose; as for such, if the gravel be loose or sandy, you should take one load of strong loam and two of gravel, and so cast them well together.

The month of March is the properest time for laying gravel; for it is not prudent to do it sooner, or to lay walks in any of the winter months before that time. In making these walks, great regard must be had to the level of the ground, so as to lay the walks with easy descents toward the low parts of the ground, that the wet may be easily drained off: but when the ground is level, it will be proper to have sink-stones laid by the sides of the walk, and at convenient distances, to let off the wet; and when the ground is naturally dry, the drains from the sink-holes may be contrived so as to convey the water into fesspools, from which the water will soak away in a short time; but in wet lands there should be under-ground drains, to convey the water off, either into ponds, ditches, or the nearest place proper to receive it. Some are apt to lay gravel-walks too round, but this is an error; because they are not so good to walk upon; and besides, it makes them look narrow; one inch is enough in a crown of five feet; and it will be sufficient, if a walk be 10 feet wide, that it lies two inches higher in the middle than it does on each side; if 15 feet, three inches; if 20 feet, four inches; and so in proportion. For the depth of gravel-walks, six or eight inches may do well enough; and a foot in thickness will be sufficient for any; but then there should always be a depth of rubbish laid under the gravel, especially if the ground be wet.

Some turn up gravel-walks into ridges, in December, in order to kill the weeds; but this is very wrong, since it never answers the end; and, therefore, if constantly rolling them after rain and frost, will not effectually kill the weeds and moss, you should turn the walks in March, and lay them down at the same time. In order to destroy worms that spoil the beauty of gravel or grass walks, some recommend the watering them with water made very bitter, by steeping walnut-tree leaves in it; but if, in the first laying of the walks, there be a good bed of lime-rubbish laid at the bottom, it will prove the most effectual method to keep out the worms, for they never harbour near lime.

GRAVEL, in medicine, a disease of the bladder and kidneys, occasioned by a gritty collection of matter therein, whereby the due secretion and exertion of the urine are impeded. The calculus is a substance composed of earth and a very large mare of air, concreted in the renal ducts; and either remains therein, or drops down in the urinary bladder. In order to prevent those salts from shooting into crystals, lixivial salts seem to be extremely proper. Next to keep the crystals from coalescing into a calculous substance, oily medicines are very efficacious. And this rule ought always to take place, with regard to diet as well as medicines.

But, when calculous concretions are actually formed in the kidneys, and are to be brought away by the ureters, the case requires very prudent management. It is a very common error in practice to give strong forcing diureticks, with an imaginary view of driving out the gravel with the urine: whereas this intention is answered with greater safety, in most cases, by relaxing and lubricating medicines; especially, if in case of violent pain, bleeding be premised, and anodynes interspersed. For a stone is never forced out, while the patient is in great torture, though when the pain ceases, it sometimes comes away unexpectedly, and almost of its own accord, with the urine. And the reason of this is, that pain constricts the fibres of the parts, which resume their natural state, and perform their functions properly, when the troublesome sensation is over. Wherefore, three or four grains of opium, dissolved in five or six ounces of the common decoction, may be given by way of clyster; which will greatly relieve



lieve the pain, and sometimes procure greater advantages. However, there are conjunctures, after the pain is abated, when powerful diureticks may be administered; but with this precaution, that as soon as they have had their effect, they are no longer to be continued. All this time the body should constantly be kept open: wherefore, in case of costiveness, it will be expedient to give a turpentine clyster; and sometimes to purge gently with infusion of senna and manna: but strong catharticks are to be avoided.

Of the lubricating medicines above mentioned, the chief are oil of sweet almonds, sirup of marsh-mallows, emulsion made with almonds, and the like; to which may be added the use of the warm bath; but among the powerful diureticks, turpentine and soap are the best. Such is the course to be pursued in the paroxysm of the disease: but out of it, the patient should use bodily exercise, especially riding every day, but so as not to fatigue; his food should be mild, and easy of digestion; and his drink either small wine and water, or new soft ale; which will be rendered better and wholesomer, if ground-ivy leaves be infused in it, while it is working. Mead is likewise a proper drink; for honey is an excellent diuretick. A spoonful also of honey, in a glass or two of the infusion of marsh-mallows' roots, is an admirable cleanser of the kidneys, if used for a constancy. The wines ought to be the softest and smoothest that can be had; and the lightest, clearest river or running water is preferable to all others. For, as Pliny says, those springs are particularly condemned, the waters of which line the vessels in which they are boiled, with thick crusts.

But particular care should be taken, not to put the patient into a course of powerful diureticks, with a view of preventing the gravel from concreting in the kidneys; because, whatever great things may be said of this sort of medicines by ignorant pretenders, they certainly injure the parts by their heat and acrimony.

**GRAVELLING**, an accident that often happens to a horse in travelling, occasioned by some small gravel stones getting between the hoof and the shoe, where they fester and fret the part. It is cured by taking off the shoe, picking out all the gravel, washing the part affected, and then pouring upon it hot a composition of sheep's tallow and bay salt mixed together.

**GRAVELLY Land**, that which abounds with gravel and sand. The best manure of these lands is marl, or any stiff clay that will dissolve with the frost, cow-dung, chalk, mud, and half rotten straw from the dunghill.

**GRAVER**, the name of a tool by which all lines, scratches, and shades, are engraved on copper, &c. There are three sorts of gravers, round-pointed, square-pointed, and lozenge-pointed. The round are best for scratching; the square-pointed for cutting the larger strokes; and the lozenge-pointed for the most delicate strokes: but a graver of a middle form, between the square and the lozenge-pointed, will make the strokes or hatches appear with more life and vigour. See the article **ENGRAVING**.

**GRAVING**, among seamen, the act of cleansing a ship's bottom. See **CAREENING** and **DOCKING**.

**GRAVITATION**, in philosophy, the pressure which one body exerts upon another by reason of its gravity. See **ATTRACTION**.

**GRAVITY**, the natural tendency which all bodies have towards a centre. See **ATTRACTION**.

**GRAVITY**, in mechanics, the tendency of bodies towards the centre of the earth. Gravity is of two kinds, absolute and relative, or specific.

**Absolute GRAVITY** is the whole force with which a body tends downwards, or towards the centre of the earth, and is always equal to the quantity of matter the body contains, without any regard to its bulk; so that the absolute gravity of a pound of wood is equal to that of a pound of iron.

**Relative or Specific GRAVITY** is the excess of gravity of one body above that of another of equal dimensions, and he is always proportionable to the quantity of matter under that dimension. Thus a cubick inch of iron is heavier than a cubick inch of wood; for

the iron being more than the wood, contains a greater quantity of matter under the same bulk. For the method of finding the specific gravities of bodies; see **Hydrostatical BALANCE**.

**GRAVITY of the Air**. See **AIR** and **ATMOSPHERE**.

**GRAY**, or **GREY**, in horsemanship, a mixed colour, compounded of black and white. See **COLOUR**.

**GREASE**, in farriery, a swelling and gourdiness of the legs of a horse. This disease is generally the effects of a faulty blood, and happens mostly to horses of a gross constitution; sometimes it is owing to carelessness in the persons that look after them, for want of keeping their limbs clean and dry; but for the most part horses that run late in the winter at grass are the most subject to it; their blood by that means growing poor and dropical, exposes them first to swell in their limbs, and then to eruptions, which discharge a foetid stinking matter, resembling melted glue; and when it turns sharp and corrosive, it becomes very troublesome. Sometimes the grease breaks out only behind, sometimes before; and when the constitution is very bad, it will break out in all the four limbs at the same time. When the heels are very much swelled and full of hard scabs, it is necessary to begin the cure with poultices, which may be made with either turnips or rye-flower, turpentine, and hog's lard, mixed with spirit of wine or red wine lees; and when the horse comes to move his limbs with less stiffness, it will be proper to purge him, which in some cases must be repeated five or six times before you can obtain the desired effect. Where there are pretty large swellings in the limbs, diureticks that work powerfully by urine, often succeed better than purges.

**Molten GREASE**, a distemper incident to very fat horses from over-riding, or any violent exercise. It is known by the horse's voiding a greasy matter with his dung; though this symptom sometimes attends fat horses that stand much in the stable, and have but very little exercise, on their catching the least cold. But when a horse's grease is really melted, it is always accompanied with a fever, heat, restlessness, starting, tremors or tremblings, great inward sickness, shortness of breath, and sometimes with the symptoms of a pleurisy. In order to cure this disease, it is necessary to bleed plentifully, in order to empty the vessels; and several rowels or issues should be cut in different parts of his body. Clysters are also of great service, and ought to be rather of the emollient kind, than purgative, as they are principally intended to cool the intestines; all the other internals ought likewise to be cleansing, attenuating and opening.

**GREAT**, a term of comparison, applied to things of large or extraordinary dimensions, &c.

**GREAT Circles of the Sphere**, are such as divide the sphere into two equal parts or hemispheres, in contradistinction to the less circles, which cut the sphere into unequal parts. See **SPHERE**.

**GREAT Circle Sailing**. See **SAILING**.

**GREEK**, or **GRECIAN**, something relating to ancient Greece.

**GREEK Church**, that part of the Christian church established in Greece and other parts of Turkey.

**GREEK Language**, the language spoken by the ancient Greeks, and still preserved in the writings of Plato, Aristotle, Demosthenes, Thucydides, Xenophon, Homer, Hesiod, &c. The Greek language was that of a people who had a taste for the arts and sciences, which they happily cultivated; and hence it abounds with very significative terms, which are often borrowed by the moderns, and applied to any new discovery, instrument, machine, &c.

**GREEK Orders**, in architecture, are the Dorick, Ionick, and Corinthian; the other two, namely, the Tuscan and Composite, being called the Latin orders.

**GREEN**, one of the original colours of the rays of light. See **COLOUR**.

**GREEN**, among painters and dyers, is a colour produced by a mixture of yellow and blue, which will be either deeper or lighter in proportion to the quantity of yellow used in the composition.

**GREEN-CLOTH**, a board or court of justice, held in



in the compting-house of the king's household, composed of the lord-steward and the officers under him, who sit daily, and take cognizance of matters of justice within the verge of the court, which extends about 200 yards every way from the east gate of the palace where his majesty resides.

**GREEN-HOUSE**, a conservatory, or house erected in a garden, for the preservation of those sorts of plants which cannot endure the cold of our winters if exposed to the open air. A green-house is distinguished from a stove or hot-house by its not having much artificial heat used in it; therefore those plants which are usually placed in it are not very tender, and will bear to be out in the open air during the summer season. In (*plate XL. fig. 7.*) is exhibited a view of a green-house with two glass cases adjoining to the ends; these may be used for the preservation of succulent plants, or for forcing roses, strawberries, &c. according to the fancy of the owner; and vines may be trained within-side from the bottom without, whereby in summer they will produce excellent bunches of the finest and most delicious grapes, of those sorts which would not ripen without doors with us, and would also be a good succession to those grapes which are forced in the stove. The length of these glass-cases may be from 10 to 25 feet, and eight or nine feet in width, with flues, *ff* (*fig. 9.*) in the back, to be used in damp or frosty weather; the door-way, *a*, at those times may be opened, which will admit from the glass-cases so much warmth into the green-house as to keep out the frost, which is all the artificial heat required. The upper part of the south side of the roof of the green-house may be tiled or slated, under which shutters should be so contrived that by means of lines and pulleys they may be let down on the glasses or pulled up at pleasure; these will be a good security against frost, snow, or hail; the pillars in front should not be broader than may be thought necessary for the support of the roof, for there cannot be too much light in a green-house; the glasses in front should be sliding sashes, in order to give air to the plants at proper times; these should have shutters which may fold back against the piers within-side; the middle one should be a glass door, for the convenience of bringing in or carrying out the plants; this need not be used at other times, as there are other entrances into the green-house, as out of the glass-cases at *a*, or from the sheds at *b*; these sheds are very convenient for tools and other purposes, as likewise they keep the back of the cases warm; and it would not be amiss if one was continued behind the green-house, to prevent the frost and damps entering that way, otherwise the back requires a greater thickness of brick-work. In the section, the space between the roof and the ceiling, should be filled up with straw, pease-haulm, reeds, fern, or some such matter, to prevent the frost penetrating that way. The depth of the green-house should not be less than 12 feet, nor more than 20; we think about 15 or 16 feet a good dimension, for if it exceeds 20, there must be more rows of plants placed to fill the house than can with convenience be reached in watering and cleaning; nor are houses of too great depth so proper for keeping of plants as those of a moderate size: as to the length, it should be proportioned to the quantity of plants it is to contain; about 50 feet is a moderate length, when the width is about 15, for if it is longer, the middle part of the house will receive no benefit of the fires in severe frosts. The height of the sashes in front of the green-house may be from eight to 16 feet, and should be glazed with crown glass, but the slope part of both places should be glazed with green glass; for if they are glazed with crown glass, the leaves of the plants are very apt to be burnt in different places, in hot sunshine days in March or April, which frequently happens by the uneven panes collecting the rays of the sun to a focus, but the green glass is not so likely to do so: the ceiling and the walls should be stuccoed, or plastered and white washed, but stucco is best, as it does not rub or peel off; this is necessary to help to keep out the frosts, as also to reflect the light, for there cannot be too much light, as was observed before. The floor of the green-house, &c. which should be laid either with brechen squares, Pur-

beck stone, broad tiles, or hard bricks, according to the fancy of the owner, must be raised a foot at least above the surface of the ground whereon the house is placed; but if the situation is moist and springy, and thereby subject to damps, it should be raised at least three feet above the surface; and if the whole is arched with low brick arches under the floor, it will be of great service in preventing the damps rising in winter, which are often very hurtful to the plants, especially in great thaws, when the air is often too cold to be admitted into the house to take off the damps.

In this green-house the plants are to be disposed so as to form a rising surface from the front to the back; trussels of different heights are necessary to place the plants on when their heights are too equal, the lowest row should be forwardest next the windows, leaving a space to walk along; the rows of plants should rise gradually from the first, in such a manner that the heads of the second row should be entirely advanced above the first, the stems being only hid thereby, and so on for the rest. At the back of the house within-side there should be a passage left of four or five feet, for the convenience of watering the plants, as also to admit of a current of air round them, that the damps occasioned by the perspiration of the plants may be better dissipated, which by being pent in too closely, often occasions a mouldiness upon the tender shoots and leaves; and when the house is close shut up, this stagnating rancid vapour is often very destructive to the plants, for which reason they should never be crowded close together. In the principal house should be placed the most admired ever-greens, such as orange, lemon, and citron trees, myrtles, geraniums, &c. the lemon and citron trees next the fire, they being more tender than the orange; and where there are various sorts of plants they should be so disposed that their different foliage and tints of green may make an agreeable contrast; but as to the several sorts of succulent plants, such as aloes, sedums, torch-thistles, melon-thistles, euphorbiums, &c. (as was before observed) they should be placed in the glass-case by themselves, as there is a great difference in nature between ever-greens, herbaceous plants; and those we call succulent.

The sloping glasses of these cases should be made to slide, the upper ones over the lower, which may be fixed, as also the front glasses may be contrived one to slide by the other; this is absolutely necessary to admit air to the plants in warm weather, in a greater or less quantity, according as there may be occasion.

But, besides the conservatories here mentioned, it will be proper to have a deep hot-bed frame, such as is commonly used to raise large annuals in the spring; into which may be set pots of such plants as come from Carolina, Virginia, &c. while the plants are too small to plant in the open air; as also may other sorts from Spain, &c. which require only to be screened from the violence of the frosts, and should have as much free air as possible in mild weather; which can be no better effected than in one of these frames, where the glasses may be taken off every day when the weather will permit, and put on every night; and in hard frosts, the glass may be covered with mats, straw, pease-haulm, or the like, so as to prevent the frost from entering the pots to freeze the roots of the plants, which is what will, many times, utterly destroy them; though a slight frost pinching the leaves or shoots very seldom does them much harm: if these are sunk a foot or more below the surface of the ground, they will be the better, provided the ground is dry; otherwise they must be wholly above ground: the sides of this frame should be built with brick, with a curb of wood laid round on the top of the wall, into which the gutters, on which the glasses slide, may be laid: the back wall of this frame may be about five feet high, and the front three feet, the width about six feet, and the length in proportion to the number of plants: as the plants which this frame is designed to protect during the winter are hardy enough to admit of being removed out of it in April, it may be used for raising in the summer a crop of melons, &c. which will keep it fully employed all the year.



**GREGARIOUS**, an epithet applied to such animals as live together in flocks or herds.

**GREGORIAN Calendar**. See **CALENDAR**.

**GREGORIAN Year**. See **YEAR**.

**GREWT**, among miners, implies earth of a different colour from the rest, found on the banks of rivers as they are searching for mines.

**GRIFFON**, in heraldry, an imaginary animal, supposed by the ancients to be half eagle and half lion.

**GRINDING**, *Trituratio*, the reducing hard substances to fine powders, by means of mills, rubbing them in a mortar, or with a muller on a marble.

**GRIPE**, in husbandry, a small ditch cut across a meadow or ploughed land, in order to drain it.

**GRIPES**, among sailors, certain ropes hooked to the decks of a ship, and drawn tight over the boats, to secure and prevent them from being shaken by the agitation of a ship at sea.

**GRIPING**, in the sea-language, the inclination of a ship to run to the windward of her course, when she steers with a wind on either quarter. This is partly occasioned by the shock of the waves which strike her on her weather-quarter, but chiefly by the arrangement of the sails, which dispose her at such a time to edge continually to windward. See **QUARTER**.

**GRIST**, in country affairs, implies corn already ground, or ready for grinding.

**GROAT**, an English money of account, equal to 4d.

**GROGRAM**, among manufacturers, a kind of stuff composed of silk and mohair.

**GROIN**, *Pubes*, in anatomy. See **PUBES**.

**GROOM**, a name applied to several superior officers belonging to the king's household.

**GROOM**, is more particularly used for a servant appointed to attend horses in the stable.

**GROMMET**, among sailors, a sort of wreath or ring of rope to fasten a sail to any stay, upon which it is drawn along at the time of hoisting and lowering it, by the help of these grommets, as a curtain is extended or drawn together along its rod, by the assistance of rings.

**GROOVE**, among miners, the shaft or pit sunk into the earth, whether in the vein or not.

**GROOVE**, among joiners, implies the channel made by their plough in the edge of a moulding, &c.

**GROSS-WEIGHT**, among merchants, signifies the whole weight of any commodity, including the dust, dross, and bag, chest, &c. in which it is contained.

**GROSSULARIA**, the gooseberry and currant bushes.

**GROTESQUE**, something whimsical, extravagant, and monstrous.

**GROTTO**, in natural history, a large deep cavern in some rock or mountain.

**GROTTO** is also used for a small artificial edifice made in a garden, in imitation of a natural grotto. The outsides of these grottos are usually adorned with rustick architecture, and their inside with shell-work, coral, &c. and also furnished with various fountains, and other ornaments.

**GROVE**, in gardening, a small wood impervious to the rays of the sun.

**GROUND**, in painting, that surface upon which figures, &c. are represented.

**GROUND**, in etching, a gummous, &c. composition with which the copper-plate is besmeared, so that the aqua fortis may only eat into the parts cut through, or pared off with the needle-points.

**GROUND-IVY**, *Hedera terrestris*, in botany, a low plant, whose stalks are square, hollow, and jointed, somewhat hairy and of a dusky green, or more usually a purplish colour.

Ground-ivy is an attenuant and dissolvent, and is famous as a vulnerary. It is much used with us in an infusion, in form of tea, for disorders of the breast and lungs, and is sometimes made an ingredient in the pectoral decoctions. A conserve made of the young plant when in flower early in spring retains its virtues in a very agreeable form, but it is seldom kept in the shops. Authors give it the character of a specific in erosions and exulcerations of the viscera, and particularly of the kidneys, and of the lungs: on this account the juice has

been given for a long course of time to people in consumptions, and it is said with success. Lindanus speaks greatly of it in an empyema and vomica pulmonum, and recommends it before all other medicines to such as void blood and purulent matter by urine. Etmuller recommends it in bruises from falls, and St. Pauli tells us, that in case of the gravel or stone in the kidneys, there is no medicine equal to the powder of ground-ivy given in drops of a scruple or  $\frac{1}{2}$  a dram two or three times a day for a considerable time. Ray tells us, that the juice of it snuffed up the nose is a cure for head-achs, even of the worst kind, and externally very great praises are given to it as a cleanser and healer of ulcers; the leaves bruised and applied with a little lard, or any such substance, to reduce them to form, and keep them from drying up too soon.

**GROPE**, in painting and sculpture, an assemblage of several figures of men, animals, fruits, &c. that have some relation to one another. In a good painting, all the figures must be divided into two or three groupes. There are two ways of considering groupes; 1. With regard to the design; and 2dly, to the clair obscure. The first is common to works of painting and sculpture; the latter peculiar to painting. Groupes with regard to the design are assemblages of divers figures which have relation to each other. Groupes with regard to the clair obscure are figures wherein the lights and shades are diffused so as to strike the eye together, and naturally lead it to consider them in one view.

**GRUBS**, in medicine, white unctuous pimples commonly on the face, and chiefly on the alæ of the nose. They are cured by evacuation and acrid lotions.

**GRUME**, *Grumus* a concreted clot of blood, milk, or any other substance. Hence grumous blood denotes that consistence of the blood wherein it is too viscid for a due circulation, and by stagnating in the capillaries, produces divers diseases.

**GRY**, a measure containing  $\frac{1}{10}$  of a line; a line is  $\frac{1}{10}$  of a digit; and a digit  $\frac{1}{10}$  of a foot; and a philosophical foot  $\frac{1}{3}$  of a pendulum, whose vibrations in 45 deg. latitude, are each equal to 1" or  $\frac{1}{60}$  of a minute of time.

**GUAIACUM**, called also *lignum vitæ*, is a medicinal wood, extremely hard and solid, of a dense compact texture, and remarkably heavy; it consists of two parts, a central matter or heart, as it is called in trees, and an exterior one or blea.

Guaiacum is attenuant and aperient: it promotes the discharge by sweat and urine, and at the same time strengthens the stomach and the other viscera. It is an excellent medicine in obstructions of the liver and spleen, in jaundices, dropies, and many other chronick cases. It gives great relief in rheumatisms, and even in the gout.

The bark is a more powerful attenuant than the wood, but it is less proper to people of a feverish disposition. Neither of them are given much in substance, the usual way being in decoction with assafras, and other medicines of the same intention.

**Gum-GUAIACUM**, a resin exuding from the guaiacum-tree. It is of a brown colour, partly redish, and often greenish, brittle, of a glossy surface when broke, of a pungent taste; and when rubbed or heated, of an agreeable smell: its smoke, in burning, has somewhat the smell of that of wood. Such should be chosen as has pieces of the bark adhering, and easily parts from them by a few quick blows. The masses which have no bark, especially the large ones, are often sophisticated. We received for gum-guaiacum, a whole box of an artificial composition of colophony and balsam of sulphur: this abuse was readily distinguishable by the smell of the compound, when laid upon burning coals, and even by its appearance upon breaking. Out of an ounce of gum-guaiacum, rectified spirit of wine dissolves six drams and two scruples: of the remainder, water applied at first, extracts four scruples out of an ounce: of the residuum, spirit dissolves four drams and two scruples. In distillation, it gives over a little both to water and to spirit, so little as to be altogether inconsiderable. Its virtues are the same with those of the wood. It is used pretty frequently in England, very rarely



rarely in Germany, the pure resin artificially extracted from the wood by means of spirit of wine, advantageously and elegantly supplying its place.

**GUARANTY**, in policy, the engagement of neutral kingdoms or states, whereby they undertake that certain treaties should be inviolably observed.

**GUARD**, in a general sense, signifies the defence or preservation of any thing; the act of observing what passes, in order to prevent surprize; or the care, precaution, and attention we make use of, to prevent any thing happening contrary to our intention and inclinations.

**GUARD**, in the military art, is a duty performed by a body of men, to secure an army or place from being surprized by an enemy. In a garrison, the guards are relieved every day, and it comes to every soldier's turn once in three days; so that they have two nights in bed, and one upon guard. To be upon guard, to mount the guard, to dismount the guard, to relieve the guard, to change the guard, the officer of the guard, or the serjeant of the guard, are words often used, and well understood.

**Advanced-GUARD** is a party of either horse or foot, that marches before a more considerable body, to give notice of any approaching danger. When an army is upon the march, the grand-guards, which should mount that day, serve as an advanced-guard to the army: in small parties, six or eight horse are sufficient, and these are not to go above four or five hundred yards before the party. An advanced-guard is a small body of 12 or 16 horse, under a corporal, or quarter-master, posted before the grand-guard of a camp.

**Artillery-GUARD** is a detachment from the army to secure the artillery; their corps-de-garde is in the front, and the centries round the part. This is a 48 hours guard: and upon a march, they go in the front and rear of the artillery, and must be sure to leave nothing behind; if a gun or waggon break down, the captain is to leave a part of his guard to assist the gunners and matrosses in getting it up again.

**Corps-de-GARDE**, are soldiers entrusted with the guard of a post, under the command of one or more officers.

**Counter-GUARD**, in fortification, is a work raised before the point of a bastion, consisting of two long faces parallel to the faces of the bastion, making a salient angle: they are sometimes of other shapes, or otherwise situated.

**Forrage-GUARD**, a detachment sent out to secure the forragers, which are posted at all places, where either the enemy's party may come to disturb the forragers; or where they may be spread too near the enemy, so as to be in danger of being taken. They consist both of horse and foot, and must stay at their posts till the forragers all come off the ground.

**Grand-GUARD**, three or four squadrons of horse, commanded by a field-officer, posted at about a mile and an half from the camp, on the right and left wings, towards the enemy, for the security of the camp.

**Main-GUARD**, that from whence all the other guards are detached.

**Picquet-GUARD**, a good number of horse and foot, always in readiness in case of an alarm: the horse are all the time saddled, and the riders booted. The foot draw up at the head of the battalion, at the beating of the tattoo; but afterwards return to their tents, where they hold themselves in readiness to march upon any sudden alarm. This guard is to make resistance, in case of an attack, till the army can get ready.

**Quarter-GUARD**, a small guard, commanded by a subaltern officer, posted by each battalion, about an 100 yards before the front of the regiment.

**Rear-GUARD**, that part of the army which brings up the rear, which is generally the old grand-guards of the camp. The rear-guard of a party is six or eight horse, that march about 4 or 500 paces behind the party. The advanced-guard of a party, on its going out, make the rear-guard on its return.

**Standard-GUARD**, a small guard, under a corporal, out of each regiment of horse, and placed on foot, in the front of each regiment.

**Van-GUARD**, that part of the army which marches in the front.

**GUARDS** also imply the troops kept to guard the king's person.

**GUARD**, in fencing, implies a posture proper to defend the body from the sword of the antagonist.

**GUARD-BOAT**, in naval affairs, a boat commanded by a lieutenant, appointed to row around the ships in a harbour, to see that the officers in each ship observe their watch, and call to the boat as she passes, and do not suffer them to board without a watch-word.

**GUARD-SHIP**, a vessel of war appointed to superintend the marine affairs in a harbour or river, and see that the ships who are not commissioned have their proper watch kept duly every night, also to receive and secure seamen who are impressed in the time of war.

**GUARDIAN**, in law, a person who has the charge or custody of such person or persons as have not sufficient discretion to take care of themselves; as idiots, or children under age.

**GUAZUMA**, in botany, the bastard cedar-tree.

**GUIDON**, the name of a sort of standard carried by the king's life-guards; so called from its being broad at one extreme, and almost pointed at the other, and slit or divided into two.

**GUIDON** also implies the officer who carried the guidon.

**GUILD**, or **GILD**, a Saxon word signifying a company, or fraternity.

**GUILDHALL**, the chief hall of a city or corporation, where the courts are held.

**GUINEA-PEPPER**, in botany. See **CAPSICUM**.

**GUINEA-PIG**, in zoology, a quadruped of the rat kind, with a variegated body, resembling in some measure that of a young pig; whence the name.

**GUITAR**, a musical instrument of the stringed kind, used greatly in Spain, and at present in England.

**GULA**, in anatomy, the same with oesophagus. See the article **OESOPHAGUS**.

**GULA**, or **GOLA**, in architecture, the same with cymatium, or ogee. See **CYMATIUM** and **OGEE**.

**GULES**, in heraldry, the true scarlet colour, and expressed in engraving by lines falling perpendicular from the top of the escutcheon to the bottom.

**GULPH**, in geography, a part of the sea almost surrounded by the land.

**GUM**, in pharmacy, a concreted vegetable juice, which transudes through the bark of certain trees, and hardens upon the surface.

**GUM**, among gardeners, a kind of gangrene incident to fruit-trees of the stone kind, arising from a corruption of the sap, which, by its viscosity, not being able to make its way through the fibres of the tree, is, by the protrusion of other juice, made to extravasate and oze out upon the bark. When the distemper surrounds the branch, it admits of no remedy, but when only on one part of a bough, it should be taken off to the quick, and some cow-dung clapped on the wound, covered over with a linen-cloth, and tied down. M. Quintine directs to cut off the morbid branch two or three inches below the part affected.

**GUM-ARABICK**, a hard, dry, solid gum, brought to us from Arabia, and when good, is extremely pellucid.

It is used in various trades, particularly by callico-printers, &c. It is also used in various compositions in the shops.

**GUMS**, *Gingivæ*, in anatomy. See **GINGIVÆ**.

**GUM-BOILS**, a morbid affection of the gums, called by writers of surgery, parulides. These are of different degrees, and usually arise from pains of the teeth. They are to be treated by discutients as other inflammatory tumors; but if these fail, or the disorder is neglected, it usually terminates in an abscess or fistula. Sage, camomile, and elder-flowers, boiled in milk and water, make a good gargarism to be held in the mouth, and the remaining herbs may be sewed up in a bag to be kept hot to the cheek. A half roasted fig is a very good internal application; and, when the softness of the tumor shews that the matter is suppurated, it ought immediately to be opened with the lancet, to prevent the



the matter lodging there, and eroding the bone, and producing a fistula or caries.

**GUN**, a fire-arm, or weapon of offence, which forcibly discharges a ball, shot, or other offensive matter, through a cylindrical barrel, by means of gun-powder. See **GUN-POWDER**. Gun is a general name, under which are included divers, or even most, species of fire-arms. They may be divided into great and small.

Great guns, called also by the general name cannons, make what we also call ordnance, or artillery; under which come the several sorts of cannons, as cannon-royal, demi-cannon, &c. Culverins, demi-culvers, fakers, minions, falcons, &c. See **CANNON**, **CULVERIN**, &c. as also **ORDNANCE** and **ARTILLERY**.

Small guns include musquets, musketoons, carabines, blunderbusses, fowling-pieces, &c. See **MUSQUET**, &c.

Pistols and mortars are almost the only sort of regular weapons, charged with gun-powder, that are excepted from the denomination of guns. See **PISTOL** and **MORTAR**.

The advantage of large guns, or cannons, over those of a smaller bore, is generally acknowledged. Robins observes, that this advantage arises from several circumstances, particularly in distant cannonading. The distance to which larger bullets fly with the same proportion of powder, exceeds the flight of the smaller ones almost in proportion to their diameters; so that a 32lb. shot, for instance, being somewhat more than six inches in diameter, and a 9lb. shot but four inches, the 32lb. shot will fly near half as far again as that of the 9lb. if both pieces are so elevated as to range to the farthest distance possible. Another and more important advantage of heavy bullets is, that with the same velocity they break holes in all solid bodies, in a greater proportion than their weight. Finally, large cannons, by carrying the weight of their bullet in grape or lead-shot, may annoy the enemy more effectually than could be done by ten times the greater number of small guns.

**GUN** is also a name given by the miners to an instrument used in cleaving rocks with gun-powder. It is an iron cylinder of an inch and a quarter thick, and about 6 inches long, and having a flat side to receive the side of a wedge, and a hole drilled through it to communicate with the inside of the hole in the rock. The hole is made of about 8 inches deep, and in the bottom of it are put about 2 or 3 ounces of gun-powder; then this gun is driven forcibly in, so as to fill up the hole, and the wedge is driven in on its flat side to secure it. The priming at the hole is then fired by a train, and the orifice being so well stopped by this gun, the force of the powder is determined to the circumjacent parts of the rock which it splits.

**GUNNEL**, in ship-building, the upper part of a ship's side.

**GUNNER**, an officer appointed for the service of the artillery; or a person skilled in the art of gunnery.

**GUNNER of a Ship of War**, an officer appointed to take charge of the artillery and ammunition abroad, and to teach the men the exercise of great guns.

**Master GUNNER of England**, an officer appointed to instruct all such as would learn the art of gunnery, and to administer an oath to every scholar; which, besides allegiance, obliges him not to serve any foreign state without leave, nor instruct any in the art but such as have taken the said oath; and to certify to the master of the ordnance the sufficiency of any recommended to be one of his majesty's gunners. A gunner should know his pieces, their names, which are taken from the height of the bore, the names of the several parts of a piece of ordnance, how to tertiate and pishpart his gun, &c.

**GUNNERY**, the art of charging, directing and shooting guns and mortars to the best advantage. In gunnery, it is necessary to know the force and effect of gun-powder, the dimensions of pieces, and the proportions of powder and ball they carry, with the methods of managing, charging, pointing, sponging, &c. The method of elevating the piece to any given angle, and computing its range; that is, raising and directing it so as to hit any proposed object; it is brought under mathe-

matical consideration. The instruments chiefly used herein are the callipers, or gunner's compasses, quadrant, and level. The line or path which a bullet describes, whatever direction or elevation the piece be in, is the same with that of all projectiles, namely, a parabola.

Maltus, an English engineer, is mentioned as the first who taught any regular use of mortars, in 1634; but he knew nothing of the curve the shot describes, nor of the difference of range at different elevations; though there are certain rules founded on geometry for these things, most of which we owe to Galilao, and his disciple Torricellius. A ball or bomb begins to rise from its line of direction, the moment it is out of the mouth of the piece; for the grains of powder highest the breech, taking fire first, press forward, precipitately, not only the ball, but likewise those grains which follow the ball along the bottom of the piece; where successively taking fire, they strike the ball underneath, and so raise it towards the upper edge of the mouth of the piece, where a considerable canal is observable in pieces much used, whose metal is soft, from the friction thereof. Thus a ball going from the cannon, as from the point of the parabola E (*plate XL. fig. 8*) raises itself in its progress, to the vertex G; after which it descends by a mixt motion. Ranges made from the elevation of 45° are the greatest; and those made from the elevations equally distant both ways from 45° are equal; thus a ball from a piece levelled to the 40th degree will be thrown the same distance as when elevated to 50°, &c.

To find the different ranges of a piece of artillery, make a very exact experiment by firing off a piece of cannon, &c. at an angle well known, and measure the range made with all the exactness possible; say, as the sine of double the angle under which the experiment is made: is to the sine of double the angle of any elevation proposed :: so is the range known by the experiment: to the other required. See the whole doctrine fully explained under the article **PROJECTILES**.

**GUNPOWDER**, a composition made of saltpetre, sulphur, and charcoal incorporated and granulated, which readily takes fire and expands with incredible force. Bartholdus Schwartz, or the Black, was the first who taught the use of gunpowder to the Venetians in 1380; but what shews gunpowder to be of an older æra is, that the Moors, being besieged in 1343 by Alphonfus, discharged a sort of iron mortars that made a noise like thunder. There is mention made of gunpowder in the registers of the chambers of accounts in France as early as 1338. In short, our countryman Roger Bacon knew of gunpowder 150 years before Schwartz was born: for that friar expressly mentions the composition in his treatise *De Nullitate Magiæ*.

In order to reduce the nitre to powder, they dissolve a large quantity of it in as small a proportion of water as possible: then keeping it continually stirring over the fire, till the water exhales, a white dry powder is left behind.

In order to purify the brimstone employed, they dissolve it with a very gentle heat; then scum and pass it through a double strainer. If the brimstone should happen to take fire in the melting, they have an iron cover that fits on close to the melting vessel, and damps the flame. The brimstone is judged to be sufficiently refined if it melts without yielding any foetid odour, between two hot iron plates, into a kind of red substance. The coal for making of gunpowder is either of the willow or hazel, well charred in the usual manner, and reduced to powder: and thus the ingredients are prepared for making this commodity; but as these ingredients require to be intimately mixed; and as there would be danger of their firing, if beat in a dry form; the method is to keep them continually moist either with water, urine, or a solution of sal ammoniack; and to continue thus stamping them together for 24 hours; after which the mass is fit for corning, and drying in the sun, or otherwise, so as sedulously to prevent its firing.

The explosive force of gunpowder is now a thing commonly known; but the physical reason thereof may not, perhaps, be hitherto sufficiently understood. In order to explain it, let us observe (1.) That salt-peter, of itself, is not inflammable; and though it melts in



the fire, and grows red-hot, yet does not explode, unless it comes in immediate contact with the coals. 2. That brimstone easily melts at the fire, and easily catches flame. 3. That powdered charcoal readily takes fire, even from the sparks yielded by a flint and steel. 4. That if nitre be mixed with powdered charcoal, and brought in contact with the fire, it burns and flames. 5. That if sulphur be mixed with powdered charcoal, and applied to the fire, part of the sulphur burns slowly away, but not much of the charcoal. And, 6. That, if a lighted coal be applied to a mixture of nitre and sulphur, the sulphur presently takes fire, with some degree of explosion, leaving a part of the nitre behind; as we see in making the *sal prunellæ* and *sal poly-chrestum*.

These experiments, duly considered, may give us the chymical cause of the strange explosive force of gunpowder: for each grain of this powder, consisting of a certain proportion of sulphur, nitre, and coal, the coal presently takes fire, upon contact of the same spark; at which time both the sulphur and the nitre immediately melt, and, by means of the coal interposed between them, burst into flame, which spreading from grain to grain propagates the same effect almost instantaneously; whence the whole mass of powder comes to be fired: and as nitre contains a large proportion both of air and water, which are now violently rarified by the heat, a kind of fiery explosive blast is thus produced; wherein the nitre seems, by its aqueous and aerial parts, to act as bellows to the other inflammable bodies, sulphur and coal; blow them into a flame, and carry off their whole substance in smoke, and vapour. The discovery of this composition was accidental, and perhaps owing to the common operation of fulminating nitre with sulphur, for making of *sal-prunellæ*: it appears to have been known long before the time of Schwartz, as being particularly mentioned by friar Bacon, as we have before observed. The three ingredients of gunpowder are mixed in various proportions, according as the powder is intended for musquets, great guns, or mortars; though those proportions seem hitherto not perfectly adjusted, or settled by competent experience.

There are two general methods of examining gunpowder; one with regard to its purity, the other with regard to its strength: its purity is known by laying two or three little heaps near each other upon white paper, and firing one of them; for if this takes fire readily, and the smoke rises upright, without leaving any dross, or feculent matter behind, and without burning the paper, or firing the other heaps, it is esteemed a sign that the sulphur and nitre were well purified; and the coal was good; and all the three ingredients were thoroughly incorporated together: but, if the other heaps also take fire at the same time, it is presumed, that either common salt was mixed with the nitre, or that the coal was not well ground, or the whole mass not well beat and mixed together; and, if the nitre or sulphur was not well purified, the paper will be black or spotted. In order to try the strength of gunpowder, there are two kinds of instruments in use; but neither of them appear more exact than the common method of trying to what distance a certain weight of powder will throw a ball from a musquet.

To increase the strength of powder, it seems proper to make the grains considerably large, and to have it well sifted from the small dust. We see that gunpowder reduced to dust has but little explosive force; but, when the grains are large, the flame of one grain has a ready passage to another, so that the whole parcel may thus take fire near the same time; otherwise much force may be lost, or many of the grains go away, as shot unfired. It should also seem that there are other ways of increasing the strength of powder, particularly by the mixture of salt of tartar: but perhaps it were improper to divulge any thing of this kind, as gunpowder seems already sufficiently destructive.

GUN-SHOT-WOUNDS, are attended with much worse consequences than wounds made by sharp instruments; for the parts are more shattered and torn, especially when the shot falls upon the joints, bones, or any considerable part.

In treating these wounds, the following rules must be

observed; to extract all foreign bodies, to stop the hæmorrhage, to promote suppuration, to encourage new flesh, and to make an even cicatrix. The extraction of foreign bodies should, if possible, be performed with the hand; or, if that cannot be done, with the forceps or a hook. They are easiest removed at first; for, after some delay, the tumour and inflammation of the parts, render it difficult and painful. Sometimes the orifice of the wound is so narrow, that it will be impossible to come at the body you have a desire to extract, without making a larger opening; which should be done on the most convenient side, always observing that no nerve, blood-vessel, tendon, or ligament lies in the way. And as two balls are frequently concealed in the same wound, after the removal of one, the surgeon should diligently search for another, or for any other extraneous body that may be forced in with it, which might protract the cure of the wound. When an attempt is made to extract the ball, or any other extraneous body, the patient should be laid in the same situation he was in at the time of receiving the wound; for, by frequent changes of situation, the ball will easily bury itself and get out of your reach. Whenever a ball has penetrated so deep, that you can easily feel it with your finger on the side opposite to the wound, you should examine nicely whether it is safest to bring it back by the way it came in, or to make an opening upon it, and draw it out at the opposite side. If the wound cannot safely be enlarged, nor the balls extracted without great pain and danger, they must be left in the wound, either till the pain is abated, or the passage rendered so easy by suppuration, that they work themselves out. On the other hand, extraneous bodies are instantly to be removed, where there is danger of bringing on convulsions, pain, and an inflammation, by being left behind. If a ball has passed into any of the cavities of the body, where the extraction of it cannot be attempted with safety, it is best to leave it where it has lodged, and to heal the wound: for there have been variety of instances, where persons have carried balls within them for many years, without suffering any inconvenience. Balls lodged in the bones, are to be extracted with rostrated forceps, observing the same rules and directions we have already laid down. When this cannot be done, they may be laid hold of with a sort of trepan necessary to extract balls that are lodged in bones, and that are covered with a large quantity of flesh, as in the thigh bone; but if the ball is so strongly fixed in the bone, as to resist all these methods, it must be left there till the parts suppurate, and set it at liberty. Balls that are thrown into the joints are to be removed with all expedition, for delays are here extremely dangerous; but it is scarce possible to prevent violent pains, inflammations, and caries of the bones, which generally require amputation of the limb. In wounds from large guns, the joint or bone is frequently grievously shattered, or carried off; in this case, it is far better to take off the limb at once, than to spend a great deal of time in fruitless attempts to cure it; for the natural figure of the shattered joint can never be restored, and the branches of nerves that were sent to the bone, and the insertion of the tendons and ligaments being torn from it in many places, cannot but bring on violent inflammations and a gangrene; but where the bones are not violently shattered and broken, the surgeon should be careful in time to remove the splinters, and all extraneous bodies, and to treat the wound according to the rules prescribed above: lastly, if any large artery is wounded, either in the arms or legs, which will appear by the loss of blood, the tourniquet should be applied, and the blood being stopped, you must endeavour to take up the vessel; by the assistance of the crooked needle; but if this cannot be done, or if the condition of the wound will allow no hopes of success from the future dressings, it will be proper to take off the limb a little above the wound.

The wound being cleaned, and the blood stopped, the first intention is to use our utmost endeavours to prevent or assuage the tumour and inflammation. The wound should be dressed up with lint dipped in spirits of wine warmed, covering it up with compresses wet with



with the same liquor, or with camphorated spirit of wine, either alone, or diluted with aqua calcis. Having done this, the next intention is to forward the sup-  
puration of the bruised and torn parts, and then to fill up the wound with new flesh, neatly cicatrized: for the method of doing which, see SUPPURATION and WOUND.

In gun-shot wounds, several grains of powder frequently penetrate the skin of the face, and occasion deformity, if they are not taken out: which may be done with a pin, or an instrument like an ear-picker: but if they are got in too deep to be picked out in this manner, the skin must be laid open with a fine small lancet, in order to get at them with the instruments we have described. Great care should be taken not to break the grains in taking them out; for that will occasion very foul spots.

GUNTER'S LINE, called also the line of numbers, and the line of lines, is a graduated line usually placed upon scales, sectors, &c. so called from Edmund Gunter, its inventor. See LINES on Gunter's Scale.

GUNTER'S Quadrant, a quadrant made of wood, brass, &c. being a kind of stereographick projection of the sphere on the plane of the equinoctial, the eye being supposed to be placed in one of the poles. See Gunter's QUADRANT.

GUNTER'S Scale, a scale generally two feet long, and about one inch and a half broad, on which are placed the line or scales of numbers, sines, tangents, meridional parts, &c. of great use in working questions in trigonometry, navigation, &c. See its various uses fully explained under the article Gunter's SCALE.

GUSSET, in heraldry, one of the abatements of honour, appropriated to lascivious or wanton persons. It is formed of a line drawn from the dexter or sinister angle of the chief, and descending diagonally to the chief point; whence another line falls perpendicularly on the base.

GUTTÆ, in architecture, ornaments in form of little cones, in the platform of the Dorick cornice, or architrave, underneath the triglyphs, representing a sort of drops or bells, usually six in number. They are sometimes called lachrymæ, companæ or campanulæ.

GUTTA SERENA, a disease in which the patient, without any apparent fault in the eye, is entirely deprived of sight. Its cause is ascribed to an obstruction of the optick nerve, which may proceed from a palsy in the nerve, from a suppression of usual hæmorrhages, from ulcers healed too soon, or from an epilepsy.

Heister affirms, that it is to be cured by aromatics, carminatives, and attenuants; chiefly eye-bright, veronica, hyssop, rosemary-flowers, sage, fennel and anniseeds, valerian-root, saffraas, cinnamon and wood-lice, either in infusion, or in powder. The juice of wood-lice newly expressed, and taken for some weeks, encreasing the dose, is of excellent use; as likewise mercurials, and sometimes a salivation. If it arises from a suppression of usual hæmorrhages, they are to be restored; but if this cannot be done, artificial bleeding is to be substituted.

Coward recommends volatiles, antiscorbuticks, chalybeats, mercurials, cephalicks, and nervine medicines. Externally, issues, setons, and clysters, are said to be good, especially in the phlegmatick; but if the patient is plethorick, cupping and bleeding, particularly cauteries, or issues on the coronal suture, or in the neck, are proper: and the eyes may be washed with fennel, valerian, eye-bright, or rose-water: or an infusion of fennel-roots in wine, with bags of strengthening-herbs and fennel-seeds, may be put upon them. Sneezing powders may likewise be proper, especially florentine orrice, or horse-chefnuts. An old gutta serena, however, is generally incurable.

GUTTERS, in architecture, a kind of canals in the roofs of houses, serving to receive and carry off the

rain. Gutters, with respect to their position, are of two kinds: such as come something near a parallelism with the horizon; and such as incline towards a vertical position to the horizon.

GUTTER-TILES, those intended for gutters.

GUTTURAL, a term applied to letters or sounds pronounced or formed as it were in the throat. There are four guttural letters in the Hebrew, viz. ך, ן, ף, ם, which, for memory's sake, are termed ahachah. See the article LETTER.

GUTTY, *Gutté*, in heraldry, a term used when any thing is charged or sprinkled with drops.

GUY, in naval affairs, a rope used to keep steady any weighty body which is hoisted into, or lowered out of a ship, or to prevent any thing from being shaken at sea by the agitation of the ship on the waves.

GUZES, in heraldry, roundles of a sanguine or murry colour. These, from their bloody hue, are supposed to represent wounds.

GYMNASIARCH, *Gymnasiarcha*, in antiquity, the master of a gymnasium or place of exercise. This office was of great importance, as all the youth were trusted to this master's care to be formed to exercises of the body.

GYMNASIUM, the place where the above exercises were performed, being a publick edifice, under proper masters.

GYMNASTICKS, the art of performing the several bodily exercises, as wrestling, running, fencing, dancing, &c. The part of medicine which regulates the exercise of the body, whether for preserving or restoring health, is also termed gymnastick.

GYMNOSOPHISTS, a sect of philosophers who cloathed themselves no further than modesty required. There were some of these sages in Africa; but the most celebrated clan of them was in India. The African gymnosophists dwelt upon a mountain in Ethiopia, near the Nile, without the accommodation either of house or cell. They did not form themselves into societies like those of India, but each had his private retirement, where he studied and performed his devotions by himself. If any person had killed another by chance, he applied to these sages for absolution, and submitted to whatever penances they enjoined. They observed an extraordinary frugality, and lived only upon the fruits of the earth. Lucan ascribes to these gymnosophists several new discoveries in astronomy.

GYMNOSPERMIA, an order or division of the didynamia class of plants in the Linnæan system of botany, comprehending all those plants of that class whose flowers are destitute of a pericarpium or capsule; the seeds being lodged in the base of the cup. The plants of this order are scented, and are accounted cephalick and resolvent, the virtue being principally contained in the leaves; it includes those plants with labiated flowers, such as mint, thyme, betony, &c.

GYNÆCEUM, among the ancients, the apartment of the women, a separate room in the inner part of the house, where they employed themselves in spinning, weaving, and needle-work.

GYNANDRIA, the name of the twentieth class of plants in the Linnæan system of botany, comprehending all those whose stamina grow either on the pistillum or upon a receptacle elongated into the form of a style, and carrying on it both the stamina and pistil. All the flowers of this class have a monstrous appearance, owing to the uncommon situation of the parts of fructification; as the arum, birthwort, passion-flower, &c.

GYPSUM, in natural history, plaister stone, which, when calcined and wrought up with water, makes parget or plaister of Paris.

GYROMANCY, a kind of divination performed by walking round, or in a circle.



# H.

## H A B

**H**, The eighth letter of the English alphabet, and sixth consonant.

It is in the old Greek alphabet, and is probably derived from the Phœnician Cheth ח, by putting a stroke across the middle, instead of each end. It is formed by an effort of the larynx to modify the sound of the following vowel, by a strong expiration of the breath between the lips, closing with a gentle motion of the lower jaw to the upper, and the tongue nearly approaching the palate. Thus, the vowel *e* in *healib*, *hero*, *heaven*, &c. is differently modified from what it is in the words *endive*, *eating*, *elect*, &c.

It is a consonant of the guttural kind, as the throat concurs more to its formation than any other of the organs of speech.

Menage distinguishes two kinds of *h*; the one an aspirate, which is a consonant; and the other a mute, which has no peculiar sound distinct from that of the immediately following vowel or diphthong.

When the *h* is preceded by a *c*, both together often sound like the Hebrew ח, with a point over the right horn, as *charity*, &c.

The *ch* in most words derived from the Greek, and expressed in that language by χ, is generally sounded like a *k*, as *echo*, *chorus*, &c, though sometimes softened, as *Cheronefus*.

*Ph* is pronounced like an *f*, as *phrases*, *Philistines*, *phlegm*, &c. most of these words being of Greek, or Oriental original, proper names, &c. and wrote in Greek with a φ, and with a פ in the Hebrew.

*H* in ancient authors we meet with instead of *f*; particularly in the Spanish, where most of the words borrowed from the Latin, beginning with an *f*, take the *h* instead of it. as *hablari*, for *fabulari*, *haba* for *faba*, &c.

The sharp accent of the Greeks, which is the same with our *h*, is frequently changed for an *s*, as *ἄλς*, *sal*, *ἑπτὰ*, *septem*, &c.

Anciently *h* was put for *ch*: thus, of *Chlodovicus* was formed *Hlodovicus*, as we find in the coins of the ninth and tenth centuries; in process of time the second of *h*'s being much weakened, the *h* was entirely dropped, and was written *Ludovicus*.

The *h* is sometimes found prefixed to the *c*, as *Hcarolus*, *healendæ*, &c. for *Carolus* and *calendæ*.

*H* also, among the ancients, denotes 200, according to the Monkish verse.

*H quoque ducentos per se designat habendos.*

When a dash was added at top, ḥ signified 200,000.

HABAKKUK, or the prophecy of Habakkuk, a canonical book of the Old Testament.

There is no mention made in scripture, either of the time when this prophet lived, or of the parents from whom he was descended; but according to the authors of the lives of the prophets, he was of the tribe of Simeon, and a native of Bethzacar: and from his predicting the ruin of the Jews by the Chaldeans, it is inferred, that he prophesied before Zedekiah, or about the time of Manasses.

HABDALA, a ceremony of the Jews, observed on the sabbath in the evening, when every one of the family is come home. At that time, they light a taper, or lamp, with two wicks at least: the master of the family then takes a cup with some wine, mixed with fragrant spices; and having repeated a passage or two of scripture, as for example, "I will take the cup of salvation, &c." Psal. cxvi. and, "The Jews had light and gladness, &c." Esth. viii. he blesses the wine and spices. Afterwards he blesses the light of the fire, and

then casts his eyes on his hands and nails, as remembering that he is going to work. The whole is intended to signify that the sabbath is over, and is from that moment divided from the day of labour which follows. For this reason the ceremony is called habdala, which signifies distinction.

HABEAS CORPORA, in law, a writ issued for bringing in a jury, or such of them as refuse to appear upon the venire facias, for the trial of a cause brought to issue.

It commands the sheriff to have the jurors before the judges on such a day, &c. and is of the same nature in the Common pleas, as the distringas juratores in the court of King's bench.

HABEAS CORPUS, in law, is a writ of two kinds, the one being the great writ of the English liberty, which lies where a person is indicted for any crime or trespass before justices of the peace, or in a court of any franchise, and on being imprisoned, has offered sufficient bail, which has been refused, though the case be bailable; in which case he may have this writ out of the King's bench, in order to remove himself thither, to answer the cause at the bar of that court.

The practice in this case, is first to procure a certiorari out of the court of chancery, directed to all the justices, for removing the indictment into the King's bench, and upon that to obtain this writ, directed to the sheriff, for causing the body of the party to be brought at a certain day.

The other kind of habeas corpus is used for bringing the body of a person into court, who is committed to any goal or prison, either in criminal or civil causes; which writ will remove the person and cause from one court and prison to another.

No habeas corpus, or other writ, to remove a cause from out of an inferior court, can be allowed, if the same be not delivered to the judge of the court, before the jury who are to try the cause have appeared, and before any of them are sworn, 43 Eliz. c. 5.

The habeas corpus act, 31 Car. II. c. 2. has ordained, that a person may have a habeas corpus from any judge, on complaint made and view of the warrant of commitment, (except such person is committed for treason or felony expressed in the warrant, or some other offence that is not bailable) which habeas corpus must be made returnable immediately; and on producing a certificate of the cause of commitment, the prisoner is to be discharged on bail given to appear in the court of King's bench the next term, or next assizes, &c. Persons committed for either treason or felony, expressly mentioned in the warrant, upon a motion made in open court, in the first week of the term, or day of sessions, &c. after commitment, are to be brought to trial; and if they are not indicted the next term or sessions after commitment, on a motion made the last day of that term, they shall be let out upon bail, except it appear on oath that the king's witnesses are not ready; and in case they are not indicted or tried the second term after commitment, they shall be discharged.

Judges denying a habeas corpus, shall forfeit 500*l*. and if an officer refuse to obey it, or to deliver a true copy of the commitment-warrant, he forfeits 100*l*. for the first offence.

HABEAS CORPUS AD PROSEQUENDUM, a writ for the removal of a person in order to prosecution and trial in the proper county.

HABEAS CORPUS AD FACIENDUM ET RECIPIENDUM, a writ issued out of the court of Common pleas,



pleas, on behalf of defendants sued in inferior courts, to remove their cause into the said court.

**HABEAS CORPUS AD RESPONDENDUM**, a writ that lies where a person is imprisoned at another's suit in any prison except that of the King's bench, and a third person would sue the prisoner there; in which case this writ will remove such person from the prison where he is, into the king's bench, to answer the action in that court.

**HABEAS CORPUS AD SATISFACIENDUM**, a writ that lies against a person in the Fleet-prison, &c. to charge him in execution. The delivery of this writ to the warden is sufficient.

**HABENDUM**, in law, a term signifying to have and to hold. A deed or conveyance has two principal parts; the premises and the habendum. The office of the first is, to express the names of the grantor, the grantee, and the things granted: that of the habendum, to shew what estate or interest the grantee is to have in what is granted. According to lord Coke, the habendum is to limit the estate, so that the general implication, which, by construction of law, passes in the premises, is by the habendum controlled and qualified. Thus, in a lease to two persons, to have and to hold to the one for life, alters the implication of the joint-tenancy in the freehold, which would pass by the premises, were it not for the habendum.

**HABERDASHER**, in commerce, a feller of hats or small wares.

**HABERE FACIAS POSSESSIONEM**, a writ that lies where one has recovered a term for years in an action of ejectment, in order to put him into possession again.

**HABERE FACIAS SEISINAM**, a writ that lies where a person has recovered land in the king's court, directed to the sheriff, commanding him to give seisin of the land recovered.

**HABERGION**, a small coat of mail, or only sleeves and gorget of mail, formed of little iron rings, or mailles linked into each other. See **GORGET**.

**HABILIMENTS of War**, in our ancient statutes, signify armour, harness, utensils, or other provisions for war, without which there is supposed no ability to maintain war.

**HABIT**, in philosophy, a disposition either of mind or body, which is acquired by reiterated acts of the same kind: so that a habit is no more than the body or mind themselves considered as either acting or suffering; or it is a particular mode of the body or mind, wherein it perseveres till effaced by some contrary one.

The archbishop of Cambray defines habits to be certain impressions left in the mind, whereby we find a greater facility or inclination in doing any thing formerly done, by having the idea ready at hand to direct us.

F. Malebranche makes habits to consist in a facility which the spirits have acquired of passing readily from one part of the body to another. Upon this mechanical principle he argues, if the mind act on the body, it is probably, by means of the animal spirits lodged in the brain, ready to be sent at pleasure, by means of the nerves that terminate in the brain, into muscles of the body. This influx of spirits occasions a swelling, which is a contraction of the muscle, and consequently a motion of the part that muscle is fastened to.

**HABIT**, *Hexis*, *Habitus*, *Habitus*, *Habitus*, in medicine, denotes the settled constitution of the body, or the habitude of any thing else; as also the structure or composition of a body, or the parts thereof.

*Hexis* signifies, according to Galen, a permanent habitude, in opposition to *schesis* or *diathesis*, which is no more than a transient disposition that is easily removed. It also signifies the habit of body, under which the solid parts are comprehended; whence a hectic fever takes its name, because it is seated in those parts, and thus affects the habit.

**HABIT**, also, denotes the dress or assemblage of garments with which the body is covered. It is particularly used, among the religious, for the uniform garments peculiar to each order.

**HABITUAL**, any thing that has become a habit, or customary.

**HABITUDE**, *Habitus*, the relation which one thing bears to another.

**HADLEY's Quadrant**: See *Hadley's QUADRANT*.

**HADRIANEÆ** or *Hadrianalia*, in antiquity, games instituted in honour of the emperor Adrian: of these there were two sorts; the one held every year, and the other every five.

**HÆMATITES**, or **BLOOD-STONE**, in natural history, an extremely rich and fine iron.

It is very ponderous, and is either of a pale red, a deeper red, or of a bluish colour; usually of a very glossy surface; and when broken, of a fine and regularly striated texture; the striæ converging toward the centre of the body; and the masses thereof naturally breaking into fragments of a broad base and pointed end; appearing something pyramidal. The hæmatites is various in its degrees of purity and hardness, as well as in its figure: the finest and most pure is of a botryoid surface; the whole superficies rising into larger or smaller roundish tubercles: sometimes the hæmatites is of a coarse texture, and a laxer structure, in which state it is known to many by the name *schistus*. Blood-stone is to be chosen for medicinal use the highest coloured and most like cinnabar that can be had, and such as is heaviest and formed with the finest striæ. It is accounted astringent and desiccative. It is given in powder, from 10 grains to 25 for a dose in hæmorrhages, and is used in distemperatures of the eyes.

**HÆMATOSIS**, in medicine, sanguification or that action whereby the chyle is converted into blood.

**HÆMATOXYLUM**, **CAMPECHE-WOOD**, in botany, a genus of the decandria monogynia class. The calix is divided into five parts; the petals are five; the capsule is lanceolated, and contains one cell with two boat-shaped valves. There is but one species, viz. the campechianum, campechy or logwood, a native of America, near Carthagenæ. It is usually brought home in large logs, very hard, of a red colour, and an astringent sweet taste. It has been long used by the dyers, but not till very late as a medicine: an extracted decoction of it is said to be serviceable in diarrhœas.

**HÆMOPTYSIS**, in medicine, a spitting of blood, occasioned by the rupture or erosion of some vessel in the lungs, commonly attended with a cough and pressure on the thorax.

**HÆMORRHAGE**, *Hæmorrhagia*, in medicine, an eruption of the blood from any part of the body.

The word is Greek, *αιμορραγια*, and derived from *αιμα*, blood, and *ρρυσις*, to burst.

**HÆMORRHOIDAL**; the veins and arteries of the rectum and fundament are so denominated, as being the seat of hæmorrhoids.

**HÆMORRHOIDS**, *Hæmorrhoides*, the piles, or a discharge of blood from the hæmorrhoidal veins about the anus and rectum.

The word is Greek, *αιμορροεις*, signifying the same thing, and derived from *αιμα*, blood, and *ρρω*, to flow.

Every liberal discharge of blood from the veins of the anus, is not to be accounted excessive and preternatural; but in order to form an estimate of this circumstance, we are carefully to consider the vessels, the habit of body, the strength, the age, and the constitution of the patient; for it frequently happens, that the discharge of a certain quantity of blood proves salutary and beneficial to some; whereas the evacuation of an equal quantity proves hurtful and injurious to others: nor is every hæmorrhoidal discharge, though larger than usual, and excited by the increased quantity and commotion of the blood, to be esteemed a disease; but only such a discharge as continues long, impairs the strength, destroys the appetite, the due digestion of the aliments, nutrition, and the other functions of the body, and consequently lays a foundation for violent chronical disorders.

Every evacuation of blood from the intestinum rectum is supplied from the hæmorrhoidal vessels; but the external hæmorrhoidal vessels, rarely flow profusely; but readily degenerate into painful varices, which, when opened, discharge blood, though seldom in large quantities. Cut the internal hæmorrhoidal vessels, which are ramifications of the splenic branch, and



are distributed to the inferior substances of the intestinum rectum, and the sphincter ani, together with the small arteries arising from the inferior meseraick vessels, not only discharge a large quantity, but, when suppressed, generate those diseases, which arise from disorders of the liver, spleen, pancreas, mesentery, and intestines.

It is usually agreed, that this salutary evacuation from the veins of the anus, is owing to a difficult circulation of the blood through the hæmorrhoidal veins, in consequence of their perpendicular situation, and its difficult return to the vena portæ and the liver; and that the discharge actually happens when the extremities of the vessels, in the intestinum rectum, are so distended by the blood accumulated in them, as at last to be ruptured.

The cure. As this disorder may proceed from various causes, so there must be various intentions of cure pursued, and different remedies made choice of.

It frequently happens, that when, in plethorick bodies, the hæmorrhoidal discharge, usual at other times, is for some time stopped, it not only appears again suddenly upon any violent commotion either of body or mind, the liberal use of spirituous liquors, too hot baths, or upon taking medicines increasing the intestine motion of blood, but continues long, and is attended with a large and strong pulse. When this is the case, the first step to be taken is to divert the impetus of the blood; for this purpose venesection in the arm, or an immersion of the arms in a tepid mixture of water and wine, are of singular service: then we are to use such things as check the excessive intestine motion of the sulphureous parts of the blood, especially things of a diluting and refrigerating nature, such as drinking cold water, especially of the chalybeate kind, tincture of roses prepared with spirit of vitriol, a decoction of hartshorn, with citron or lemon juice. When, together with a loss of strength, and an injured state of the nobler functions, a large hæmorrhoidal discharge continues for a long time, and the viscera begin to be tainted, whilst, at the same time, the blood is rather aqueous and serous, than fibrous, and of a due consistence; those medicines are highly beneficial, which gradually and mildly carry off, by stool, the peccant bilious juices, and at the same time invite the humours from the intestinum rectum to the coats and glands of the other intestines. The most efficacious of these are preparations of rhubarb, with currants and tamarinds; or, if the body is bilious, with cream of tartar, exhibited in a potion rendered agreeable by an eleosaccharum, prepared with the oil of citron.

In that more obstinate and difficultly cured species of the disorder, which arises from an obstruction, an infarction, or increased bulk, of any of the viscera; such as the liver, spleen, and in women the uterus; if there is still any place for the means of relief, such medicines are to be chosen as resolve the obstructions without throwing the humors into too violent a commotion.

Among the principal causes of a too copious hæmorrhoidal discharge, we may justly reckon a want of due tone in the intestinum rectum, together with its component membranes and vessels: For this reason such medicines are also to be used as restore the strength of parts too much weakened and relaxed. As the extracts of cascarilla and red saunders.

In order to obtain the designed effect, external applications of an astringent nature are also to be used. Such as the decoction of balauetine flowers, red roses, myrrh, and Peruvian bark.

In the cure of violent hæmorrhoidal discharges, venesection is to be premised, and the primæ viæ cleansed, either with recent cassia, or the best rhubarb, exhibited in a decoction: then both internal and external medicines, of a corroborative and gently astringent nature, may be safely used.

When a sudden stoppage of the hæmorrhoidal discharge is succeeded by an uneasiness of the præcordia, inflations, restlessness, and difficulty of breathing, it is to be recalled by mild laxatives, emollient clysters, and suppositories.

In no disease is an accurate and cautious regimen more

necessary than in this, since, in consequence of a neglect in this particular, the most efficacious remedies will not produce their desired effect.

When the disorder is once removed, due pains are to be taken, in order to prevent its return. This intention is most commodiously and effectually answered, by venesection three or four times instituted every year; by cleansing the primæ viæ once a month; and by the prudent use of mineral waters, or only of chalybeated milk. And, lastly, all such aliments and laxatives, as excite pain, are carefully to be abstained from.

**HÆREDE ABDUCTO**, in law, a writ which formerly lay for the lord, who, having by right the wardship of a tenant under age, could not seize his body, as having been conveyed away by another.

**HAGGAI**, a canonical book of the Old Testament, so called from the prophet of that name, who, in all probability, was born at Babylon, from whence he returned with Zerubbabel.

This prophet, by the command of God, exhorted the Jews, after their return from their captivity, to finish the rebuilding of the temple, which they had intermitted for 14 years. His remonstrances had the desired effect; and to encourage them to proceed in the work, he assured them from God, that the glory of this latter house should be greater than the glory of the former: which was accordingly fulfilled, when Christ honoured it with his presence: for, with respect to the building, this latter temple was nothing in comparison of the former.

**HAGIOGRAPHIA**, or holy writings, a name given to a particular division of the Old Testament, as containing hymns to God, and moral precepts for the conduct of life. The books distinguished by this term were the Psalms, Proverbs, Ecclesiastes, and the Song of Solomon.

**HAIL**, *Grando*, in physiology, an aqueous concretion, in form of white or pellucid spherules, descending out of the atmosphere. Hail is evidently no other than drops of rain congealed into ice. This happens when in their passage through the inferior air, they meet with nitrous particles, which are known to contribute greatly to freezing. Their magnitude is owing to a fresh accession of matter as they pass along. Hence we see the reason why hail is so frequent in summer, because at that time greater quantities of nitre are exhaled from the earth, and float up and down the air.

**HAIR**, in physiology, slender, oblong, and flexible filaments, growing out of the pores of animals, and serving most of them as a covering. When these filaments, in human subjects, grow on the body, they are denominated pili; when on the head, capilli. These last are more proper for examination: that part of them, which is without the skin, appears cylindrick to the naked eye; but, when examined by the help of glasses, it is found to be unequal and irregular, and often knotty. It is pellucid, but is not hollow; but the extremities of them are often split into several parts, so as to resemble a pencil. The part of the hair that is within the skin, is called the root of it; and, from its roundish figure, the bulb. This part is hollow and vasculous, in the manner of the bases of the young feathers on birds: this vasculous part is inclosed in a follicle, or case, and is most conveniently to be examined in the large hairs of a cat's whiskers, or in the beards of other animals.

The origin of the hair is in the cutis, and in the fat that lies underneath it; and probably from nerves, as an acute pain is felt in pulling them off. The nutritive matter of the hair is probably the same with that of the other parts of the body; not merely excrementitious, as the old authors have supposed. It is a common assertion, that the hair grows after a person is dead; but unquestionable experiments prove this to be of the number of vulgar errors, not at all the more true for being universally received as truth.

**HAIR'S-BREADTH**, a measure in length, being the 48th part of an inch.

**HALBARD**, or **HALBERT**, in the art of war, a well known weapon, carried by the serjeants of foot and dragoons.

**HALBERT**,



**HALBERT**, among farriers, is a small piece of iron an inch broad, and three or four inches long, soldered to the toe of a horse's shoe, to hinder a lame horse from treading on his toe. These halbert-shoes necessarily constrain a lame horse, when he goes at a moderate pace, to tread or rest on his heel, which lengthens and draws out the back finew, that was before in some measure shrunk.

**HALF-MOON**, *Demi-lune*, in fortification, a work which is commonly made before the curtain or flanked angle of the bastion: the former generally consists of two little flanks and two faces, which terminate in a salient angle towards the fields; the gorge of the demi-lune is terminated by two lines continued from the counterscarpe of the fosse, that form an entering angle towards the place, about the middle of the curtain. The demi-lune on the flanked angle of the bastion differs only from the former, in that it is formed by a circular line, and hence it takes its name demi-lune. The moderns make use of good counterscarps to cover the bastions instead of the demi-lunes.

They call a demi-lune what was formerly denominated a ravelin, only that this last work has no flanks, and has two faces terminating in a salient angle towards the fields. A demi-lune is said to be crowned, when it is covered by a crowned work: it is in like manner said to be a tenaille, when on the right and left it has two works constructed in a right-angle on the flanked angle of the demi-lune, by the prolongation of its two faces between 28 and 30 toises; each of these works having two faces, terminating in a salient angle towards the field, and a ditch of nine toises that separates them from the demi-lune and counterscarpe. Lastly, a demi-lune is called a horned work, when it is counter-guarded by two works that advance in form of a horn towards the country, having before it a little demi-lune or lunette that covers the intermediate space betwixt them, and consequently the flanked angle of the demi-lune.

**HALF-MOON**, in architecture, a circular plan of a building like an amphitheatre, in order to gain ground before it. A semi-circular place before any castle, or at the end of a garden, is called a half-moon.

**HALF-PENNY**, an English copper coin, the value of which is denoted by its name.

**HALF-SEAL**, in chancery, that with which commissions to delegates appointed on an appeal in an ecclesiastical or maritime cause are sealed.

**HALF-TONGUE**, *Medietas Linguae*, in law, an inquest impanelled, of which the one half consists of natives or denizens, and the other of aliens. It is used in such pleas, where the one party is a stranger, and the other a denizen.

**HALIEUTICKS**, *Halieutica*, a treatise on fish or the art of fishing. We have Oppian's Halieuticks still extant.

**HALL**, *Salle*, in architecture, the first, largest, and finest partition of an apartment, in the house of ministers of state, magistrates, &c. where they dispatch business and give audience. If the hall be loftier and larger than ordinary, and placed in the middle of the house, it is called a saloon. Vitruvius mentions three sorts of halls: the tetrastyle, which has four pillars supporting the plafond, or ceiling; the Corinthian, which has columns all around let into the wall and vaulted over; and the Egyptian, which had a peristyle of insulated Corinthian columns, bearing a second order with a ceiling. A royal apartment is said to consist of a hall, called aula prætoriana; an antichamber, called procamera; a chamber or camera; a cabinet or concave; and a gallery or porticus.

**HALL**, is likewise a publick building, for the administration of the justice of a city, &c. as the Guildhall in London, which is the great court of judicature for that city: here meetings of the citizens are held for the election of sheriffs, &c. and their solemn entertainments are kept.

**HALL** particularly denotes a court of justice, as Westminster-Hall, where the great courts of this kingdom are held, as the Chancery, King's-Bench, Common-Pleas, and Exchequer.

Westminster-Hall was the palace of our ancient kings, who ordinarily held their parliaments and courts of judicature in their places of residence, as the kings of Spain still do, and frequently sat in person, as they still do in parliament. The great hall at Westminster is said to have been built by William Rufus; others say by Richard I. or II. It is 300 feet long, and 100 broad.

**HALLAGE**, the toll paid to the lord of a fair or market for commodities sold in the common hall of a place.—It is particularly applied to a fee due for cloth brought for sale to Blackwell-hall in London.

**HALLELUJAH**, a term of rejoicing sometimes sung or rehearsed at the end of verses in the Psalms on particular occasions.

**HALLIARDS**, or *HALYARDS*, in a ship, are ropes which serve for hoisting up the yards.

**HALMOTE**, or *HALIMOTE*, the same with what is now called a court-baron, being a meeting of the tenants of the same hall or manor, where differences between the tenants were determined.

**HALO**, in physiology, a meteor, in form of a luminous ring, or circle, of various colours, appearing round the bodies of the sun, moon, or stars. The word is formed of the Greek *αλω*, or *αλων*, area.

That around the moon is the most usual, and is called *corona*, crown. Naturalists conceive the halo to arise from a refraction of the rays of light in their passing through the fine rare vesiculæ of a thin nubecula, or vapour, towards the top of our atmosphere; which account they confirm hence, that a quantity of water being thrown up against the sun, as it breaks and disperses into drops, it forms a kind of halo, or iris, exhibiting the colours of the natural rainbow.

M. Huygens supposes halos, or circles round the sun, to be formed by small round grains of a kind of hail, made up of two different parts, one of which is opaque, and inclosed in the other, which is transparent; which is the general structure observed in hail. After the same manner he accounts for the parhelia; only that he imagines the icy grains of an oblong figure, and rounding at the ends, like cylinders with round convex tops. Where some of these cylinders are in an erect position, the circle they form will be white, by reason of the reflexion of the rays of the sun on the surface of these cylinders. He proceeds to account for the coloured halo's and parhelia, from the same hypothesis; and produces an experiment of a glass cylinder, a foot long, having within it an opaque kernel (which was a cylinder of wood), and the ambient space filled with water: this cylinder, being exposed to the sun, and the eye disposed in a proper place, the several successive reflexions and refractions necessary to produce such an effect did plainly appear.

The light which comes through drops of rain by two refractions, without any reflexion, Sir Isaac Newton observes, ought to appear strongest, at the distance of about 26 degrees from the sun, and to decay gradually both ways, as the distance from him increases and decreases: and the same is to be understood of light, transmitted through spherical hailstones.—Add, that if the hail be a little flatted, as is often the case, the light transmitted may grow so strong at a little less distance than that of 26 degrees, as to form a halo about the sun or moon; which halo, as often as the hailstones are duly figured, may be coloured; and then it must be made red within by the least refrangible rays, and blue without by the most refrangible ones; especially if the hailstones have opaque globules of snow in their centre, to intercept the light within the halo, as Huygens has observed, and make the inside thereof more distinctly defined than it would otherwise be. Such hailstones, though spherical, by terminating the light by the snow, may make a halo red within, and colourless without, and darker in the red than without, as halo's used to be: for of those rays which pass close by the snow, the rubiform will be least refracted, and so will come to the eye in the directest lines.

**HALTER-CAST**, among farriers, an excoriation of the pastern occasioned by a horse's endeavouring to scrub the itching part of his body near the head and neck, when one of his hinder feet entangling in the halter, he sometimes



Sometimes receives very dangerous hurts in the hollow of his pasteron by his struggling to disengage himself.

For the cure of this, take linseed oil and brandy, of each an equal quantity; shake them together in a bottle till they are well mixed, and anoint the place morning and evening, having cut first away the hair; but care must be taken to keep the foot very clean.

**HALTING**, among farriers, a limping or going lame, an irregularity in the motion of a horse, arising from a lameness in the shoulder, leg, or foot, which makes him spare the part, or use it timorously.

**HALYMOTE**, in old law books, signifies a holy or ecclesiastical court.

**HAM**, in anatomy, the part behind the knee.

**HAM**, in old law writers, a Saxon word used for a home or dwelling place, for a borough and a village, and also for a little narrow slip of meadow.

**HAM**, in cookery, the leg and thigh of a hog seasoned and dried.

**HAMBLING**, or **HAMELLING**, in the forest law, is the hamstringing of dogs, or cutting the great tendon called the hamstring.

**HAMLET**, **HAMEL**, or **HAMPSEL**, is a small village, or part of a parish.

**HAMMER**, a well known tool used by mechanicks, consisting of an iron head, fixed crosswise upon a handle of wood.

**HAMMOCK**, among sailors, a piece of canvas about six feet long, and three feet wide, drawn together at the two ends, and hung horizontally under the deck for the sailors to sleep in. In time of battle, they are strongly fastened and laid above the rails on the quarter-deck and fore-castle, to barricade and prevent the execution of small shot.

**HAMSOKEN**, in old law-books, signifies the liberty or privilege a man enjoys in his own house. It is also said to signify a franchise granted to lords of manors, by which they hold pleas, and take cognisance of the breach of that immunity. In Scotland it is used for the crime of him that violently, and contrary to the peace, assaults a person in his own house.

**HAND**, *Manus*, in anatomy, the extreme part of the arm. See **ARM**. The bones of the hand are those of the carpus, metacarpus, and fingers, with the ossa sesamoidea. The gibbous or convex part of the two first of these bones, constitutes the back of the hand; and the hollow part, the palm. Their bodies are placed distant from each other, and the interstices between them are filled up with the muscles called *musculi interossei*, serving to move the fingers. The mechanism of the hand, is admirably contrived to answer the manifold uses and occasions wherein it is employed, being made up not only of nerves, muscles, &c. but a great number of little bones, all curiously jointed into each other; whence its extraordinary flexibility, which enables it to lay hold of adjacent bodies.

*Luxation of the HAND*, in surgery. The hand is said to be luxated forwards, or inwards, when it recedes from the muscles that bend the fingers; the luxation is said to be backward, when it departs from the muscles which extend the fingers; and when the carpus makes a tumour near the thumb, and cavity near the little finger, the luxation is said to be outward. To reduce luxations of the hand, it must be sufficiently extended by two assistants; one of which is to lay hold of the hand, and the other of the humerus, pulling in opposite directions; then the part of the hand where the sinus is, must be placed on a flat table, that whatever sticks out may be depressed by the surgeon, and the hand reduced into its natural state.

**HAND**, in the menage, a measure of four inches, or of a clinched fist, by which the height of a horse is computed. Thus, a horse of war should be sixteen hands high.

**HANDING the Sails**, in the sea-language, the same as **FURLING**; which see.

**HANDSPIKE**, a sort of bar used to heave the wind-lafs round at the time of weighing the anchor. It is also used as a lever on many occasions.

**HANKS**, in the marine, certain wooden rings fixed upon the stays of a ship, to which the stay-sails are

fastened in different places, as a curtain is fastened to the rings which run upon its rod: by these the sails are easily extended upon the stays to their utmost stretch.

**HANPER**, **HANAPER**, or **HAMPER**, an office of the chancery, answering to the *fiscus* of the Romans.

**HANSE**, or **HANS**, a company of merchants united for the promotion and advantage of trade.

**HANSE-TOWNS**, port-towns of Germany, of which Lubeck and Hamburg were the chief. They were formerly all of them imperial cities, confederated for their mutual defence, and the protection of their trade.

**HAPPINESS**, among philosophers, consists in the enjoyment not only of the goods of the body, as health, strength, neatness, decency, &c. but also of the more refined goods of the mind, as knowledge, memory, taste, and especially the moral virtues, magnanimity, fortitude, benevolence, &c.

**HAQUEBUT**, **HAQLUT**, **HARQUEBUSS**, or **ARQUEBUSE**, a kind of fire-arm. The word is French, *Arquebuse*, and derived from the Italian *Arco*, a bow, and *Busio*, a hole, on account of the touch-hole, at which the priming is put, and as it succeeded to the ancient bow.

**HARANGUE**, a speech made by an orator in public. It is frequently used for a pompous and prolix declamation.

**HARBINGER**, an officer of the king's household, having fourteen yeomen under him, who ride a day's journey before the court, when it travels, to provide lodgings, &c.

**HARBOUR**, a place where ships may ride safe at anchor, chiefly used in speaking of those secured by a boom and chain, and furnished with a mole. See **BOOM**, **CHAIN**, and **MOLE**.

**HARDENING**, the act of communicating a greater degree of hardness to a body than it had before. Steel and iron are hardened and tempered divers ways, as by the hammer; quenching it, when hot, in cold water; case-hardening, &c.

*Case-HARDENING* is a less degree of steel-making, and performed by baking razors, files, knife-blades, &c. in a kind of oven, and laying over them a strata of powdered charcoal, hoofs, horns, &c. so as to exclude the air; and thus by baking to give a coat of steel to these instruments some depth below their surface. Others cover the iron or steel all over with a composition of an equal quantity of powdered horn, bay-salt, and stale urine, or white wine vinegar, well mixed together, and then wrap it up in loam or plate iron, and bring the whole to the fire to a blood-red heat, and no higher; and, lastly, take it out and quench it.

**HARDNESS**, in philosophy, that quality in bodies, whereby their parts mutually cohere together, so as not to give way to an external impulse, nor yield inwards, without breaking. Hardness in this sense is in contradistinction to softness.

**HARDS**, or **HURDS**, the coarser part of hemp or flax, separated from the fine.

**HARDY SHRUBS**, among gardeners, are those which endure the austerity of the winter.

The two hardiest shrubs we are possessed of, are the ivy and box; these stand the severity of our sharpest winter unhurt, while other shrubs perish, and trees have their solid bodies split and torn to pieces. In the hard winter of the year 1683, these two shrubs suffered no injury any where; though the yews and hollies, which are generally supposed very hardy, were this winter in some places killed, and in others stripped of their leaves, and damaged in their bark.

**HARE**, in zoology, an animal of the lepus kind, distinguished by its abrupt tail and black eyes. It greatly resembles the rabbit, but is larger, and somewhat longer, in proportion to its thickness; and its ears are remarkably long, being always in a position to receive the least sound, and moveable with surprising ease.

**HARIOT**, or **HERIOT**, in law, a due belonging to a lord at the death of his tenant, consisting of the best beast, either horse, ox, or cow, which he had at the time of his death; and in some manors, the best goods, piece of plate, &c. are called harlots.

**HARLEQUIN**, a buffoon or merry-andrew; but is now



now used for a person of extraordinary agility, dressed in party-coloured cloaths, the principal character in a pantomime entertainment.

**HARMONIA**, in anatomy, a species of articulation, being a kind of symphyfis intended for absolute rest.

**HARMONICA**, or, as it is often improperly called, **ARMONICA**, among musicians, is an instrument composed of musical glasses.

**HARMONICAL ARITHMETICK**, that part of arithmetick which considers musical intervals, expressed by numbers, in order to our finding their mutual relations, compositions, and resolutions.

**HARMONICAL COMPOSITIONS**, in a general sense, includes both harmony and melody, that is, of musick or songs, both in a single part and in several parts.

**HARMONICAL INTERVAL**, in musick, denotes the difference of two sounds, which is agreeable to the ear, whether in consonance or succession; and are therefore the same with concord. See **CONCORD. INTERVAL**.

**HARMONICAL SERIES**, a series of many numbers in continual harmonical proportion. Thus if there are four or more numbers, of which every three immediate terms are harmonical, the whole will make an harmonical series: such is 30: 20: 15: 12: 10. Or if every four terms immediately next each other are harmonical, it is also a continual harmonical series, but of another species, as 3, 4, 6, 9, 18, 36, &c.

**HARMONICAL SOUNDS**, are those produced by the parts of the chords, &c. which vibrate a certain number of times, while the whole chord vibrates once. The relations of sounds had only been considered in the series of numbers, 1: 2, 2: 3, 3: 4, 4: 5, &c. which produced the intervals called octave, fifth, fourth, third, &c. Mr. Sauveur first considered them in the natural series, 1, 2, 3, 4, 5, &c. and examined the relations of sounds arising therefrom. The result is, that the first interval, 1: 2, is an octave; the second, 1: 3, a twelfth; the third, 1: 4, a fifteenth, or double octave; the fourth, 1: 5, a seventeenth; the fifth, 1: 6, a nineteenth, &c.

**HARMONICKS**, *Harmonica*, a division of the ancient musick. It considers the differences and proportions of sounds with respect to gravity and acuteness, in contradistinction to rhythmica, or metrica.

**HARMONY**, in musick, the agreeable result of an union of several musical sounds, heard at the same time.

As a continued succession of musical sounds produces melody, so a continual combination of them produces harmony.

**HARMONY** may also be divided into that of concords, where nothing but these are admitted; and into that of discords, where they are intermixt with the concords.

**HARMONY** is sometimes applied to a single voice, when sonorous and soft; or to a single instrument, when yielding a very agreeable sound.

**HARMONY** also denotes a certain agreement between the several parts of a discourse, which renders the reading thereof agreeable.

**HARMONY**, in architecture, an agreeable relation between the parts of a building.

**HARMONY**, in painting, both in the composition and colours of a picture: the former denotes the connection between the figures, with respect to the subject of the piece: in the colouring it denotes the agreeable mixture of different colours. M. de la Chambre derives the harmony of colours from the same proportions as that of sounds. On this principle he lays down green as the most agreeable colour corresponding to the octave; red to a fifth; yellow to a fourth, &c.

**HARMONY of the Spheres**, a sort of musick much talked of by many of the philosophers and fathers, supposed to be produced by the sweetly-tuned motions of the stars and planets.

**Pre-established HARMONY**, a celebrated system of M. Leibnitz, where he accounts for the communication between soul and body. Philosophers universally held, that the soul and body act physically on each other. Des Cartes first shewed that the heterogeneity

of their nature did not admit of such real union, and that they could only have an apparent one, whereof God is the mediator. Mr. Leibnitz, unsatisfied with either of these hypotheses, establishes a third. A soul is to have a certain series of thoughts and desires: a body, which is only a machine, is to have a certain series of motions that are determined by the combination of its mechanical disposition with the impressions of external objects.

If now a soul and body be so framed that the whole series of desires and motions of each exactly correspond, this soul and body will have a relation to one another, not by any actual union, but by the constant and perpetual correspondence between the actions of both. Now God puts together this soul and body, which had such an antecedent correspondence, such a pre-established harmony. And so of all other souls and bodies that have been or ever will be joined.

The same principle he extends to the kingdoms of nature and grace, to account for the apparent communication betwixt them, and to make physical and moral evil to correspond.

**HARNESS**, in antiquity, the complete armour of a cavalier, a cask, cuirass, &c.

**HARP**, a musical instrument of the string kind, of a triangular figure, and placed on its end between the legs to be played upon with the fingers or nails.

**HARPIES**, *Harpyæ*, ἀρπυιαι, in antiquity, rapacious impure sort of monsters, of the bird kind, described by Virg. *Æn.* III. The ancients looked on the harpies as a sort of genii.

**HARPINEER**, or **HARPOONER**, a fisherman who throws the harping-iron at a whale.

**HARPING-IRON**, *Harpoon*, *Harpago*, a large javelin of forged iron, five or six feet long, with a sharp triangular point, barbed like that of an arrow. It is fastened to a line, wherewith whales, sturgeons, &c. are caught.

**HART'S HORNS**, *Cornu Cervi*, in pharmacy, the whole horns of the common male deer, as separated from the head, without further preparation.

The chymical analysis of hart's horn is sufficiently known: it yields a water highly impregnated with a volatile salt, which is called spirit of hart's horn, with a foetid oil, and a volatile salt by the common distillation in a retort. The remainder in the bottom of the retort, after the distillation is finished, is black; but on being calcined in an open fire, it becomes white and friable, and is what is kept in the shops under the name of burnt hart's horn. Besides these preparations, we use the thin shavings of the horns, which, on long boiling in water, become a jelly: this jelly is a nutritive and strengthening; it is sometimes given in diarrhoeas; but a decoction of burnt hart's horn in water is more frequently used for this purpose, and is what is called hart's horn drink.

The salt of hart's horn is a great sudorifick, and is given in fevers of many kinds with great success; the spirit has the same and all other virtues of volatile alkalis, and is used to bring people out of faintings by its pungency, on holding it under their nose, and at the same time pouring some drops of it in water down the person's throat.

**HARPSICORD**, a musical instrument of the string kind, played on after the same manner as the organ.

**HARRIER**, a kind of hound, remarkable for his gift of smelling, and his boldness in pursuing his game.

**HARROW**, in agriculture, a dag made in a square form, to break the clods of earth after ploughing.

**HART**, in the forest law, a stag, or male deer, of five years old compleat.

**HARUSPEX**, or **ARUSPEX**. See **ARUSPICES**.

**HASTA**, or **HASTA Pura**, among medalists, implies a kind of spear or javelin, not shod or headed with iron; or rather an ancient sceptre, somewhat longer than ordinary, occasionally given to all the gods.

**HAT**, a covering for the head, chiefly made of hair, wool, &c. worked, full'd and fashioned to the figure of the head, and worn by the men throughout the western part of Europe.

Hats are said to have been first seen about the year



1400; at which time they became of use for country wear, riding, &c.

F. Daniel relates, that from the reign of Charles VII. of France, in 1449, the use of hats and caps is to be dated, which then began to take place of chaperoons and hoods. In process of time, the custom passed from the laity to the clergy; but this was looked upon as a crying abuse, and several regulations were published to prohibit it, enjoining them to keep to the use of chaperoons made of black cloth, with decent cornets fastened to their hats, and this upon pain of suspension and excommunication. It is true the use of hats is said to be of longer standing among the ecclesiasticks of Brittany by two hundred years; but these were no other than a kind of cap, whence arose the square cap now used in colleges.

*Method of making HATS.* Hats are made either of wool, or the hair of divers animals, as the beaver, hare, coney, camel, &c. The process is much the same in all. The finest hats are made of the pure hair of the beaver; women tear off the long hair with a knife like a shoemaker's knife, and the short hair they scrape off with another kind of knife: then they mix one third of dry castor to two thirds of old coat, which is a skin that has been worn some time by the savages. This stuff so mixed is carded and weighed out into parcels, according to the size and thickness of the hat intended. Then each parcel is teized with the bow-string to purify it from all filth, and to make the stuff fall precisely together, which is the most difficult part of the work. Thus they form hats of an oval figure, ending a-top in an acute angle. With what stuff remains, they strengthen them where they happen to be slender. They purposely make them thicker in the brim near the crown, than towards the circumference, or crown itself. They next harden the hats into closer flakes, by pressing down the hardening leather upon them. After which they are carried to the bason; upon which laying one hat at a time, they sprinkle it over with water and mould it: the heat of the fire, the water, and the pressing, embody the stuff into a slight hairy felt. The maker, having turned up the edges of this felt round the mould, lays it by and takes another, which, when reduced to the same consistence and form, he joins them together so as to meet in an angle a-top, making only one conical cap.

The next process is to remove the hat to the receiver or trough, upon the plank or sloping side of which the bason hat is laid, being first dipped in the kettle. Here the hatter rolls and unrolls it, one part after another, first with the hand, and then with a little wooden roller, dipping it from time to time for four or five hours, before it can be properly fulled; in which violent labour, the workmen have their hands guarded with thick leather, called gloves. A hat thus wrought is reduced to a proper shape on the block, tied down by a commander, and all under this string is left to the brim; then it is set to dry; and, when dry enough, it is singed by holding it over a flair of straw, &c. then pounced to take off the coarser nap; then they use the seal-skin; and, lastly, card it to raise the fine cotton; then fitting it to the block, they tie it, cut round the edges, and send it to the dyer's, who boils it in a copper that holds between 10 and 12 dozen, with a dye of logwood, verdigrease, copperas, alder-bark, galls, and sumack, for three quarters of an hour at a time, for 10 or 12 times successively, taking every hat out after each boiling. The dyer returns it to the maker, who hangs it to dry in the roof of a stove, under which is a charcoal fire; and thus prepares it for stiffening, which is done with melted glue, or gum seneca, smeared over it with a brush, and rubbed in with the hand; then spreading a cloth over the steaming bason, and sprinkling it with water to raise a strong steam to force in the stiffening, it is placed thereon brim downwards; and when it is moderately hot, the workman strikes gently on the brim, with the flat of his hand to make the jointings incorporate, turning it this way and that, setting it at last on the crown: then it is put on the block, brushed and ironed on the stall-board, and thus finished, ready to be lined.

HAT, is also used in a figurative sense, to signify the dignity of a cardinal, or a promotion to that dignity.

HATCHES, in a ship, a kind of trap-doors, which cover the hatch-way, or entrance into the hold, &c.

HATCH-WAY, a passage through the deck into the hold, &c.

HATCHING, the action whereby fecundated eggs, after a proper time of incubation, exclude their young. The learned Mr. Reaumur has obliged the world with an ingenious treatise on the method of hatching chickens by an artificial heat.

HATCHING, or HACHING, in designing and engraving, signifies the making of lines with a pen, pencil, graver, &c. and the crossing or intersecting those by others drawn in another direction.

HATCHINGS are of great use in heraldry, to distinguish the several colours of an escutcheon, without its being illumined. The first kind of hatching in pale, or from top to bottom, signifies *gules* or *red*. The second in fess, or across the coat, signifies *azure* or *blue*. Hatching in pale, counter-hatched in fess, signifies *green*; and that in bars, from left to right, *purple*. When the coat is only dotted, it is supposed to be *or*; and when quite bare or void, *argent* or *white*.

HATCHMENT, in heraldry, a name sometimes used for an achievement, or escutcheon over a gate, door, or on the side of a house.

HATCHMENT also signifies the marshalling of several coats of arms in an escutcheon. See the article MARSHALLING.

HATTOCK, a shock of corn containing 12 sheaves: others make it only three sheaves laid together.

HAVEN, a sea-port or harbour. See HARBOUR.

HAVER, a term used by country people for oats.

HAUNCH, or HANCH, the hip, or that part of the body between the last ribs and the thigh.

HAUNT, among sportsmen, the place to which game are accustomed to resort: among hunters it is the walk of a deer, or the place of his ordinary passage.

HAUTBOY, a musical instrument of the wind kind, shaped much like the flute, only that it spreads and widens toward the bottom, and is sounded through a reed. The treble is two feet long; the tenor goes a fifth lower, when blown: it has only eight holes; but the bass, which is five feet long, has eleven.

HAW, in botany, &c. a common name for the fruit of the white thorn. See MESPILUS.

Haw, in farriery, is a swelling and spunginess that grows in the inner corner of the eye of a horse, so large sometimes as to cover a part of the eye. The method of curing it is easily performed by cutting part of it away; but the farriers are apt to cut away too much: the wound may be dressed with honey of roses; and if a fungus or spungy flesh arises, it should be sprinkled with burnt allum, or touched with blue vitriol.

HAWK, a synonymous term with falcon, though, by some, restrained to the less sort of falcons.

HAWKER, in commerce, a pedlar, or person that goes about the country selling wares: this name is said to arise from their uncertain wandering, like persons, who, with hawks, seek their game where they may find it.

HAWKING, the exercise of taking wild-fowl by means of hawks.

HAWKWEED, in botany. See HIERACHIUM.

HAWSE, in naval architecture, that part of a ship's bow through which the cable passes, and is drawn into and let out of the ship.

HAY, a general name for any kind of grass, cut and dried for the food of cattle.

The time of mowing grass for hay, must be regulated according to its growth and ripeness; nothing being more prejudicial to the crop than mowing it too soon, because the sap is not then fully come out of the root, and when made into hay, it shrinks away to nothing. It must not, however, be let stand too long, till it have shed its seeds. When the tops of the grass look brown, and begin to bend down, and the red honey-suckle flowers begin to wither, you may conclude it ripe for mowing.

HAY-BOTE, in law, a liberty to take thorns and



other wood, to make and repair hedges, gates, &c. by a tenant for life, or years.

HAY-BOTE, is also taken for wood for the making of rakes and forks, used in making hay.

HAYWARD, the person who keeps the common herd or cattle of a town. He is appointed by the lord's court, and his office is to see that the cattle neither break nor crop the hedges of inclosed grounds; he is also to look to the fields, and impound cattle that commit trespass therein.

HAZLE, *Corylus*, in botany, a well known plant, which grows common in England in the woods and hedges; it produces male and female flowers, growing at remote distances on the same tree: the flowers are disposed in the form of an amentum; the female flowers are sessile, and included in the germ: they have neither corolla nor pericarpium. The fruit is a subovate nut, with a deraded base, and at the top a little compressed and acuminate.

Witch-HAZLE, a name sometimes given to the elm. See ELM.

HAZLE-EARTH, in agriculture, a moderately compact earth, much approaching to the nature of the chisely soil, and indeed properly a species of it, but always containing a large quantity of resin-coloured sand.

HEAD, *Caput*, the uppermost or foremost part of the body of an animal. When viewed on the outside, it is divided into the hairy scalp and the face. The hairy scalp covers the upper part of the os frontis, the ossa parietalia, the os occipitis, and the upper and lower portions of the temporal bones. The uppermost part of the hairy scalp is termed the vertex or fontanella; the back part, occiput; the lateral parts, the temples. See CRANIUM.

HEAD-MOULD-SHOT, a disease in children, wherein the sutures, generally the coronal, have their edges shot over each other, so as to compress the internal parts. This disease usually occasions convulsions, and admits of no cure, unless room could be given by a divulsion of the sutures. This disorder is opposite to the horse-shoe head. See HORSE-SHOE HEAD.

HEAD is also used for the top or extremity of any thing; thus we say, the head of a tree, &c.

HEAD, in the military art. Head of a work is the front of it next the enemy, and furthest from the place, as the front of a horn-work is the distance between the flanked angles of the demi-bastions; the head of a double tenaille is the salient angle in the middle; and the two other sides which form the re-entering angles.

HEAD, in painting, sculpture, &c. a representation of that part of the human body, whether in colours, draught, or creux: if taken from the life, or supposed to bear a just resemblance to the person, it is more properly called portrait.

HEAD-BOROUGH, the person who is chief of the frank-pledge in boroughs, or who anciently had the government within his own pledge.

HEAD-BOROUGHs, at this time, are a kind of constables. See CONSTABLE.

HEAD-LAND, in husbandry, is taken to signify the upper-part of land left for the turning of the plough.

HEAD-TIN, in metallurgy, a preparation of tin-ore toward the fitting it for working into metal. When the ore has been pounded and twice washed, that part of it which lies uppermost, or makes the surface of the mass in the tub, is called head-tin: this is separated from the rest, and after a little more washing becomes fit for the blowing-house.

HEAD, in architecture, &c. an ornament of sculpture, frequently serving as the key of an arch, platband, &c. These heads commonly represent some of the heathen deities, virtues, seasons, &c. with their attributes. The heads of beasts are also used in places suitable thereto.

In heraldry, the heads of men, beasts, &c. are borne either full-faced or side-faced, which must be distinguished in blazoning.

Moor's-HEAD, a kind of bomb or granado shot out of a cannon.

Moor's-HEAD, in heraldry, a representation of a black-moor's head, swathed with a bandage, frequently borne as a crest.

Moor's-HEAD, in chymistry, the capital of an alembick with a long neck, to convey the vapour into a vessel, which serves as a refrigeratory.

Dragon's-HEAD, in astronomy, the ascending node of the moon or other planet.

HEALING, in architecture, the covering a roof with lead, tiles, &c.

HEALTH, *Hygieia*, *Hygeia*, a proper disposition of the body, and all its parts, for performing their respective functions; and this consists in a due connexion. It is likewise applied to the mind, and then it means a just disposition of the rational powers and passions to perform their proper actions; and this, in a great measure, depends on bodily health. The preservation and restoration of health constitute the objects of the arts of medicine. The continuance of health depends principally on the six non-naturals, air, food, exercise, the passions, evacuation and retention, sleeping and waking. The ancients raised it to a goddess, to whom they supposed the care of health to belong. The Greeks worshipped her under the name *Hygieia*, and the Romans under that of *Salus*. Her temple at Rome was on the Mons Quirinalis, where she had a statue crowned with medical herbs. She is represented in medals with a serpent stretching on her left arm, and holding a patera to it with the right: sometimes she has an altar before her, with a serpent twisted round, raising its head to take something out of the same, with the inscription *SAL. AUG.*

HEAM denotes in animals the same as after-birth or secundines in women.

HEARING, *Auditus*, one of the external senses, being the act or faculty of perceiving sounds; its organ is the ear, particularly the auditory nerve diffused through it; its objects are certain vibrations of the air. See SOUND. The ear and its several membranes, nerves, canals, &c. are vehicles for the reception, modification, and transmission of sound to the brain, which is the seat of this sense. See EAR.

HEART, *Cox*, in anatomy, a muscular body situated in the cavity of the thorax, on the anterior part of the diaphragm, between the two laminæ of the mediastinum. It is somewhat conical, flattened on the sides, round at the top, and oval at the basis; this last is accompanied with appendices, called auriculæ, and by large blood-vessels; and all these are included in a membranous capsula, named pericardium.

It is hollow within, and divided by a septum, which runs between the edges into two cavities; one of which is thick and solid, called the left ventricle; the other thin and soft, termed the right ventricle; though, in their natural situation, the right ventricle is placed more anteriorly than the left. Each ventricle opens at the basis by two orifices; one of which answers to the auricles, the other to the mouth of a large artery; one of which may be termed the auricular orifice, the other the arterial orifice. The right ventricle opens into the right auricle, and into the trunk of the pulmonary artery; the left into the left auricle, and into the great trunk of the aorta. At the edges of these orifices are several moveable pellicles, called valves, of which some are turned inward towards the ventricle, that let the blood enter the heart, but hinder it from going out the same way, and are called triglochines or tricuspides; others turned towards the great vessels, which suffer the blood to go out of the heart, but hinder it from returning, and are called semi-lunares or sigmoidales. The tricuspides of the left ventricle are likewise termed mitrales.

The inner surfaces of the ventricles have thick fleshy productions called columnæ. To the extremities of these columnæ or pillars are fastened several tendinous cords; the other ends are joined to the tricuspides. There are likewise other small, short, tendinous ropes, along both the edges of the septum, in an obliquely transverse situation, forming a kind of net-work.

The cavities of the ventricles are small deep fossulæ, near each other, with small prominent interstices between. The greatest part of the fossulæ are orifices of the venous ducts.

The fleshy fibres of the heart, especially those of the right ventricle, are either bent into arches or folded into angles,



angles, the latter being longer than the former. The middle of these arches, and the angles of the folds, are turned towards the apex of the heart; and the extremities of the fibres toward the basis. These fibres not only differ in length, but in their directions, which are very oblique in all, but much more so in the long or folded fibres than in the short ones.

Each ventricle is composed of its proper distinct fibres; but the left has many more than the right. By carefully unravelling all the fibres of the heart, we find it made up of two bags contained in a third.

The tubes which cross transversely are much more numerous than those which cross longitudinally; which will serve to rectify the false notion about the motion of the heart, that it is performed by a contortion like a screw; that the heart is shortened in the time of contraction, and lengthened in dilatation.

The tricuspidal valves of the right ventricle are three triangular productions, very smooth on that side next the auricle, and on the side next the ventricle several membranous and tendinous expansions, and their edges notched. The valves of the auricular orifice of the left ventricle are of the same structure, and but two in number.

The semi-lunar valves are six in number, three belonging to each ventricle, situated at the mouths of the great arteries, and may be properly enough called *valvulae arteriales*.

The auricles are muscular bags, situated at the basis of the heart, one towards the right ventricle, the other towards the left, and joined together by an inner septum and external communicating fibres, much like the ventricles; one of them being called the right auricle, the other the left. They are very uneven on the inside, but smoother on the outside, and terminate in a narrow, flat, indented edge, like a cock's comb.

The right auricle is larger than the left, and it joins the right ventricle by a common tendinous opening. It has two other openings united into one, and formed by two large veins, which meet and terminate there, almost in a direct line, called *vena cava*, superior and inferior: the notched edge of this auricle terminates obliquely in a kind of obtuse point, which is a small production of the great bag, and is turned towards the middle of the basis of the heart.

The whole inner surface of the right auricle is uneven, by reason of a great number of prominent lines, which run across the sides of it, and communicate with each other by smaller lines, which lie obliquely in the interstices between the former.

The left auricle is pretty thick and unequally square, into which the four veins open that are called *venae pulmonares*, and which has a distinct appendix belonging to it, like a third small auricle.

Besides the great common vessels, the heart has some peculiar to itself, called the coronary arteries and veins, as in some measure they crown the basis of the heart. These arteries, which are two in number, called the right and left coronaries, go out from the beginning of the aorta, and afterwards spread round the basis of the heart, to the substance of which they send numerous ramifications. The exterior course of the veins is pretty much the same with that of the arteries; their trunk opens principally into the right auricle, by a particular orifice, furnished with a semi-lunar valve: all the coronary vessels and their ramifications communicate with each other. The pericardium consists of three laminæ, the middle and principal of which is composed of very fine tendinous filaments crossing each other in different directions. The external lamina seems to be a continuation of the outer coat of the heart, auricles, and great vessels.

The pericardium is closely connected to the diaphragm, not at the apex, but exactly at that place which answers to the flat or lower side of the heart; the rest of the bag lies upon the diaphragm without any adhesion. The external lamina, or more properly common covering, is formed by the duplicature of the mediastinum. The internal lamina is perforated by an infinite number of very small holes, through which a serous fluid continually transudes, in the same manner as in the peri-

tonæum: sometimes, upon dissection, it is of a redish colour, which may be owing to a transfusion of blood through the fine membrane of the auricles.

The heart and parts belonging to it are the principal instruments of the circulation of the blood. The two ventricles ought to be considered as two syringes so closely joined together as to make but one body, and furnished with suckers in contrary directions to each other; so as that, by drawing one of them, a fluid is let in, and forced out again by the other.

The heart is made up of a substance capable of contraction and dilatation. When the fleshy fibres of the ventricles are contracted, the two cavities are lessened in an equal and direct manner, more according to the breadth or thickness, than according to the length of the heart; because the number of transverse fibres is much greater than that of the longitudinal ones.

The fleshy fibres, thus contracted, do the office of suckers, by pressing upon the blood in the ventricles; which blood being forced to the basis of the heart, presses the tricuspidal valves against each other, opens the semi-lunares, and rushes with impetuosity through the arteries and their ramifications, as through so many elastic tubes. The blood, thus pushed on, enters the capillary vessels, and is from thence forced to return by the veins to the auricles, which like retirements lodge in the blood returned by the veins, during the time of a new contraction, which is termed *systole*.

The contraction or *systole* ceases immediately; and in that time the auricles, which contain the venous blood, being contracted, force the blood through the tricuspidal valves into the ventricles, the sides of which are thereby dilated, and this dilatation is called *diastole*. In this manner does the heart perform the circulation, and that three different ways: the first and most universal kind of circulation is that by which almost all the arteries of the body are filled by the *systole* of the heart, and the greatest part of the veins evacuated by the *diastole*.

The second kind of circulation, opposite to the first, is through the coronary vessels of the heart, the arteries of which are filled with blood, during the *diastole* of the ventricles, and the veins emptied during the *systole*.

The third kind is that of the left ventricle of the heart, through the venous ducts of which a small quantity of blood passes, without going through the lungs, which is the course of all the remaining mass of blood.

#### Explanation of plate XLI.

*Fig. 7.* The human heart seen in its convex part, and in a horizontal situation. B, branches of the coronary vein. C, branches of the coronary artery. D, the right auricle. E, branches of veins, going from the right auricle. F, the left auricle. G, the trunk of the aorta. H, the trunk of the pulmonary artery. I, the ascending trunk of the vena cava. K, the descending trunk of the vena cava. L, L, L, L, Branches of the aorta rising upwards. M, one of the branches of the pulmonary artery. N, N, N, branches of the pulmonary vein.

*Fig. 8.* The heart opened to shew the parts of its ventricles. A, the muscular septum which divides the ventricles. B, the right ventricle opening into the right auricle and into the trunk of the pulmonary artery. C, the left ventricle opening into the left auricle and into the great trunk of the aorta.

*Fig. 9 and 10* represent the heart in different positions to shew the fibres and orifices of the venous ducts. A, ascending trunk of the vena cava. B, the trunk of the aorta. C, branches of the pulmonary vein. D, descending trunk of the vena cava. E, part of the right auricle cut away to shew the different ranging of the internal fibres and venous ducts.

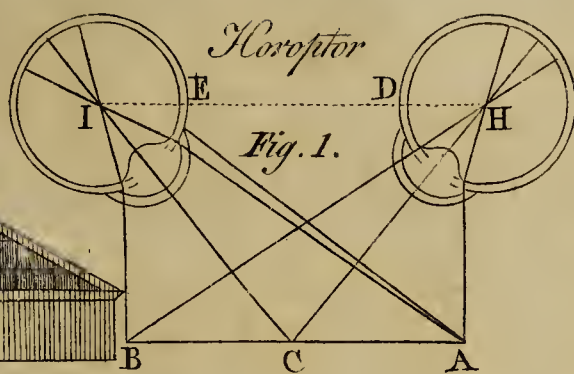
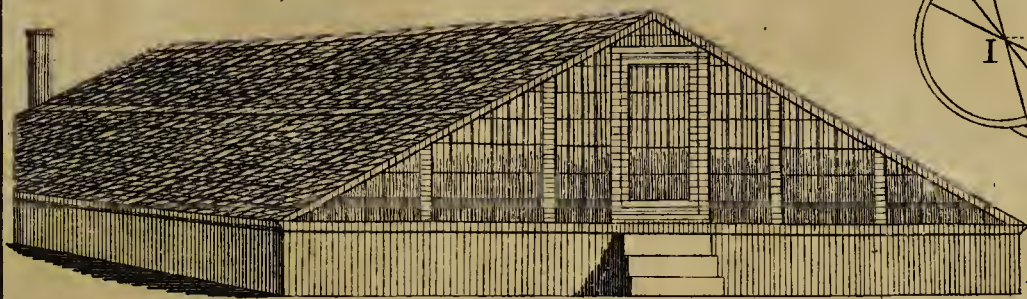
This motion of the heart is wonderful: it continues to the utmost period of life, day and night, without a single moment's interruption or intermission; and is performed more than an hundred thousand times every day. Here is, indeed, something like what the mechanicks want, under the name of a perpetual motion; and the stupendous wisdom of the Creator is in nothing more gloriously expressed.

HEART-BURN, a pain at the mouth of the stomach.

The heart-burn is usually caused either by an alkaline



Fig. 2. perspective View of a Hothouse



Infinite in Mathematicks

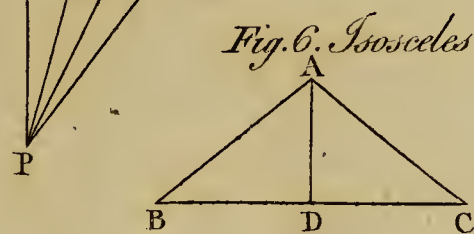
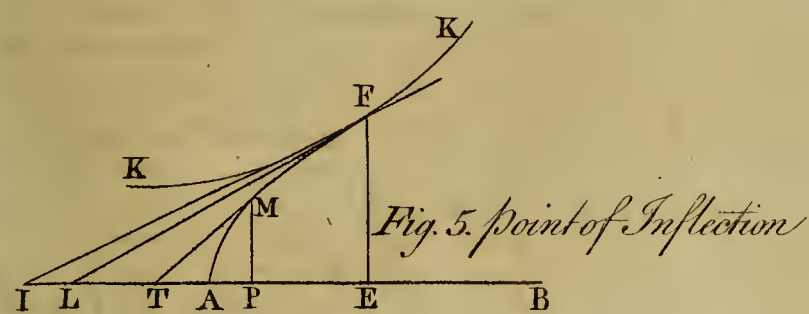
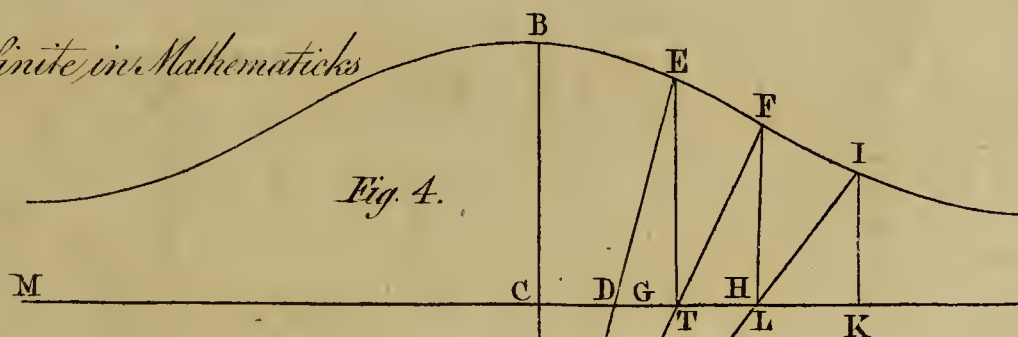
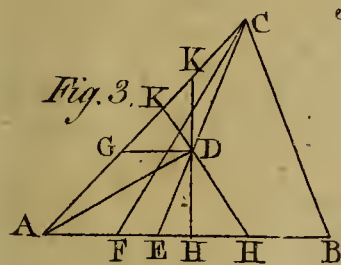


Fig. 7. Heart

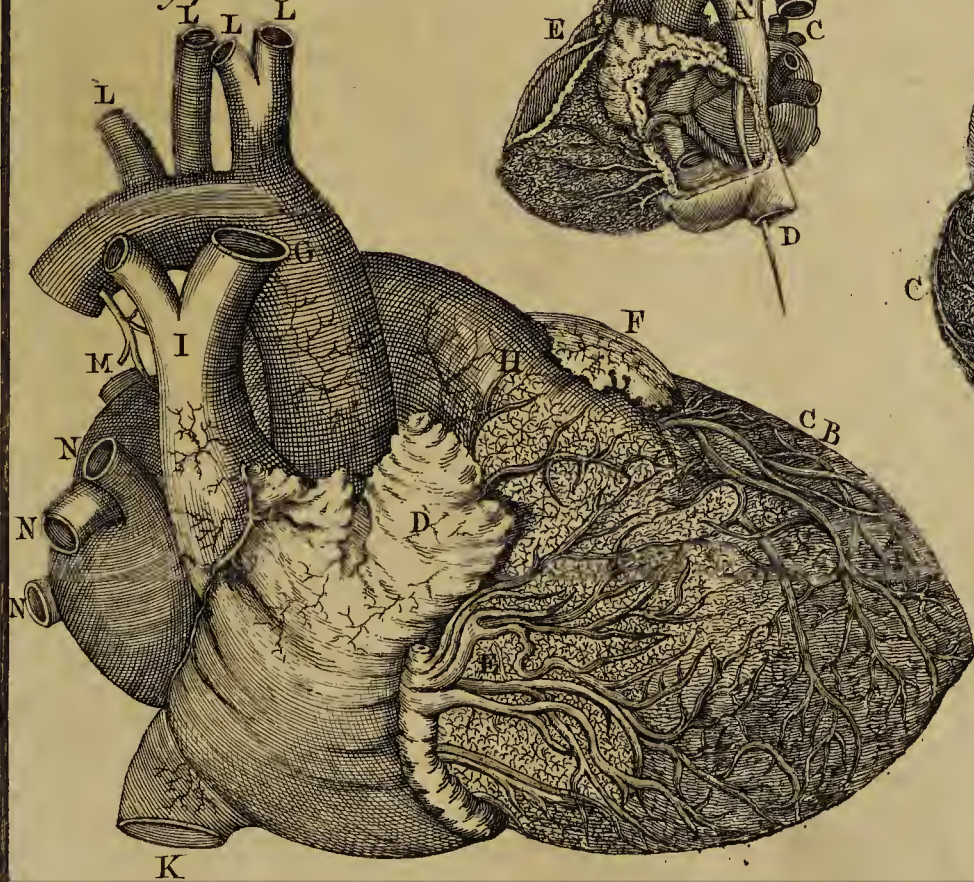


Fig. 9. Heart

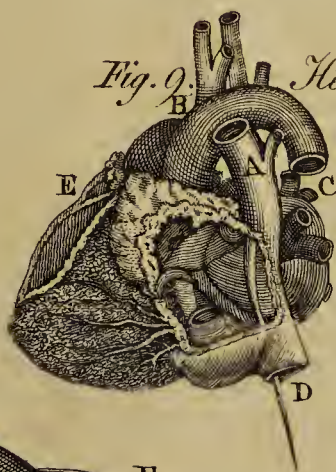


Fig. 8. Heart

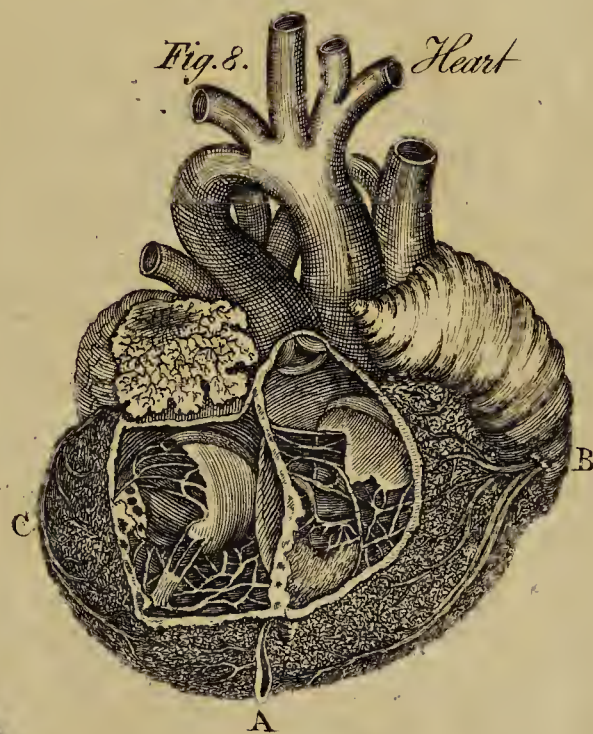
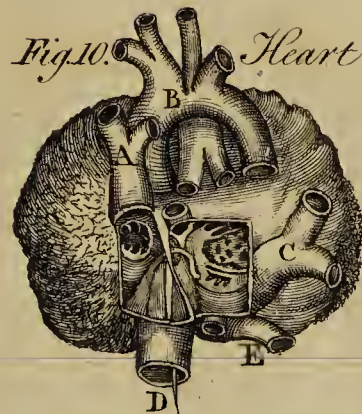


Fig. 10. Heart









or an acid acrimony prevailing in the stomach. If by a redundant acid, which is most generally the case, alkaline substances cure the present disorder, as taffaceous powders, or a clove chewed in the mouth, and swallowed gradually : but if the disorder proceeds from an alkali, the cure will consist in exhibiting acescent substances.

Galen recommends vinegar of squills as a most effectual remedy for preventing the heart-burn : but Hippocrates, in the second of his Epidemics, orders hot bread with pure wine to be given in this disorder.

HEAT, in physiology, one of the secondary qualities of bodies produced by fire, and opposed to cold. Under the article fire, we considered the sun as the principal source of heat upon the earth's surface, and the confines of the earth and atmosphere : without this, all the bodies upon our globe would doubtless grow rigid, lifeless, and fixed. It is this that stirs within them, as the main spring of their actions. Hence vegetation and animalization are evidently promoted ; and hence the ocean and the atmosphere continue in a fluid state. Heat in us is properly a sensation, excited by the action of fire ; or it is the effect of fire on our organs of feeling. See FIRE. Hence it follows, that what we call heat is a particular idea or modification of our own mind, and not any thing existing in that form in the body that occasions it. Heat, says Mr. Locke, is no more in the fire that burns the finger, than pain is in the needle that pricks it. In effect, heat in the body that gives it, is only motion ; and in the mind, only a particular idea or disposition of the soul.

Heat in the hot body, according to 's Gravesande, is an agitation of the parts of the body, made by means of the fire contained in it : by such an agitation a motion is produced in our bodies, which excites the idea of heat in our mind ; so that heat in respect of us is nothing but that idea, and in the hot body nothing but motion. If such motion expel the fire in right lines, it gives us the idea of light ; if in a various and irregular motion, only heat.

Heat, with respect to our sensations, or the effect produced on us by a hot body, is estimated by its relation to the organ of feeling ; no object appearing to the hot, unless its heat exceed that of our body. Whence the same thing to different persons, or, at different times, to the same person, shall appear both hot and cold. The degree of heat is measured by the expansion of the air or spirit in the thermometer. See THERMOMETER.

HEAT, in geography, the degree of heat in the various seasons and climates, arising from the different angles under which the sun's rays strike on the earth's surface. The earth being further removed from the sun in summer than in winter, it may be asked, how it comes to pass, that since the sun is the fountain of heat as well as light, our winters are much colder than our summers. In answer to this, it is to be considered that the rays of the sun fall with much less obliquity upon the surface of the earth, on our side of the equator, in the summer than in the winter ; and therefore they not only act more forcibly upon it, but a greater quantity of them fall upon a given place. For it is shewn in mechanicks, that a moving body, striking perpendicularly on another, acts on it with all its force ; and that a body striking obliquely, acts with the less force, the more it deviates from the perpendicular. Now fire, moving in right lines, must observe the same mechanical law as other bodies ; and consequently its action must be measured by the angle of incidence ; and hence fire, striking on any obstacle in a direction parallel thereto, has no sensible effect, by reason the ratio is almost infinite, i. e. nothing : hence the sun, radiating on the earth in the morning, scarce produces any warmth at all. Again, in the winter, besides that the sun is much lower in the heaven, when at its meridian height, than in the summer, its rays pass through a longer portion of the earth's atmosphere, by which great part are intercepted ; and some, by various refractions and reflections, turned another way.

And lastly, in summer, the sun continues with us sixteen hours, and is absent but eight ; whereas in winter, it is with us but eight hours, and is absent sixteen ; all which things conspire to make a considerable alteration with respect to heat and cold. If this be so, why is

VOL. I. No. 37.

not the weather hotter, when the sun is in the tropick of cancer, its rays then falling with the least obliquity, and passing the shortest way through the atmosphere, and the days being then at the longest, than it is about a month afterwards, when the sun is in the next sign ? In answer to this, it is to be remembered, that bodies are not always the hottest at that very instant the greatest degree of heat is applied to them : they require time to heat, as well as to cool ; it is the length of time therefore that the heat is applied to them, as well as the degree of it, that determines the quantity of heat communicated to them. For the like reason we find it warmer about two o'clock in the afternoon than at twelve, when the sun is in its meridian altitude, and its rays fall thickest and most forcibly upon the earth. The diversity of the heat of climates and seasons arising chiefly from the different angles under which the sun's rays strike upon the surface of the earth, Dr. Halley gives a mathematical computation of the effect of the sun under the different seasons and climates, going upon the mechanical principle already laid down : whence the vertical ray which is of the greatest heat being put for radius, the force of the sun on the horizontal surface of the earth will be to that as the sine of the sun's altitude at any other time : but how strictly just this calculation may be, for reasons already assigned, and from the following consideration, we wholly leave to the sagacity of our readers to determine. Let it be considered, that the different degrees of heat and cold in different places depend in a very great measure upon the accidents of situation, with regard to mountains, valleys, and soils. The first helps greatly to chill the air by the winds, which blow in eddies through the levels beyond ; and mountains, sometimes turning a concave side to the sun, have the effects of a burning mirror upon the subject plain ; and the like effects are sometimes had from the convex parts of clouds, either by refraction or reflexion. As to soils, a stony, sandy, or chalky earth, it is known, reflects most of the sun's rays into the air, again, and retains but few ; by which means a considerable accession of heat is derived to the air ; as, on the contrary black loose soils absorb most of the rays, and return few into the air, so that the ground is much the hotter.

The following table of the heat of different climates is computed for every tenth degree of latitude, to the equinoctial and tropical sun ; by which an estimate may be made of the intermediate degrees :

Lat.	Sun in ☿	Sun in ♊	Sun in ♋
0	20000	18341	18341
10	19696	20290	15854
20	18797	21737	13166
30	17321	22651	10124
40	15321	23048	6944
50	12855	22991	3798
60	10000	22773	1075
70	6840	23543	000
80	3473	24673	000
90	0000	25055	000

Hence are deducible the following corollaries : 1. That the equinoctial heat, when the sun becomes vertical, is as twice the square of the radius, which may be proposed as a standard to compare with in all other cases. 2. That under the equinoctial, the heat is as the sine of the sun's declination. 3. That in the frigid zones, where the sun sets not, the heat is as the circumference of a circle into the sine of the altitude at 6 ; and consequently, that in the same latitude these aggregates of warmth are as the sine of the sun's declination ; and at the same declination of the sun, they are as the sines of the of the latitudes into the sines of the of the declination. 4. That the equinoctial day's heat is every where as the cosine of the latitude. 5. In all places where the sun sets, the difference between the summer and winter heats, when the declinations are contrary, is equal to a circle into the sine of the altitude at 6 in the summer parallel ; and consequently these differences are the sines of the latitude multiplied by the sines of the declination. 6. It appears from the above table, that



the tropical sun under the equinoctial has, of all others the least force : under the pole, the heat is greater than that of any other day, being to that of the equinoctial as 5 to 4.

HEAT, in the animal oconomy, called the innate or vital heat, is no other than the attrition of the particles of the blood, occasioned by its circulatory motion, especially in the arteries. The generation of heat in the animal body is determined by three mechanical principles:

1. That the more dense the matter is, the degree of heat generated thereby is proportionably the greater; for by the laws of mechanicks, if two bodies move with an equal degree of velocity, the effects produced by them will bear a strict proportion to their respective densities or quantities of matter.

2. The greater the mutual pressure of the parts of one body upon those of another is, the heat generated is, *cæteris paribus*, proportionably the more intense.

3. The denser bodies are, the stronger their mutual pressure, and the quicker their motions, the greater is the degree of heat produced; for in proportion as the velocity is increased, so the mutual resistance between the body moved, and that which may be said to sustain the motion, is augmented.

But to consider the method in which heat is generated and increased in the human body more accurately: the blood itself is a body; the heart also and the arteries are bodies; and consequently the heart cannot contract itself without pressing upon the blood, and this pressure is continued by the arteries.

When a body moves from the base towards the apex of a conical canal, it must strike against its sides: hence arises a repercussion, and consequently an attrition. Now the arteries of our bodies are such conical canals, and consequently resist the impression of the blood; therefore an attrition must necessarily be produced, and by natural philosophy we are taught, that where there is attrition there also must be heat: so that there can be no heat in the human body but what is produced by the circulation of the fluids. Hence the degrees of heat are most properly estimated by the pulse. Since then all the heat in the human body is produced by the motion of the fluids, and since the excess of heat bears a joint proportion of the attrition of the moving fluids with themselves, and with the vessels in which they flow, it is hence obvious, that whatever increases the velocity of their circulatory motion, must of course increase the heat of the body: so that by motion or exercise the degrees of heat are not only increased, but also bear a proportion to the velocity of that motion.

Boerhaave, after making repeated experiments by means of Fahrenheit's mercurial thermometers, affirms that the vital heat in men amounts to 92 degrees; whereas in children it often amounts to 94; that a man is always hotter than that portion of the atmosphere which surrounds him, and that he cannot bear a heat in his body greater than an hundred and a few odd degrees, without a cessation of the circulation and death. He also affirms, that no one can live in an air which has 90 degrees of heat, but that all animals hitherto known die very quickly in it.

At the same distance from the heart, the heat of equal quantities of blood will be as their velocities; and in the same velocities of blood, the heat will be reciprocally as the distance from the heart: for since in homogeneous bodies nothing else is required to disengage the particles exciting heat, but an attrition of parts produced by the force of the heart, to which is always proportional the velocity of the blood, and the re-action of the arteries and antecedent blood; it follows, that if the re-action be not altered, then the heat of the blood will not be altered, unless by an alteration of the impetus impressed upon the blood from the heart.

The heat of the blood may be considered as a rectangle under the velocity and the distance: that is, if in two persons the velocity be as 3, and the distances wherein we would determine the heat, be as much more in one as in another, that is, as 2 to 1; the heat of one will be 6, and the other 3; that is, the heat of the first will be double that of the second. If the distance of the first be as 2, and the velocity as 4; but the distance of

the second as 3, and the velocity as 1; the heat of the first will be as 8, and of the second as 3: and so the heat of the first will be more than double the heat of the second.

HEAT, in horse-courses, either denotes the exercises to be given horses by way of preparation, &c. or the actual course they are to run the very day that is set to determine the matches.

HEATH, *Erica* in botany, a genus of the octandria-monogynia class of plants, the flower of which consists of one erect and quadrifid petal; and its fruit is a quadrilocular capsule, containing a great number of very small seeds.

The distilled water of heath-flowers is recommended for sore eyes, as also for the colick; and fomentations of them are said to be good in the gout and paralytick cases.

HEAVEN, *Cælum*, that orb over our heads where the heavenly bodies revolve. Philosophers, divines and astronomers lay down divers heavens, as the highest or empyrean heaven, the æthereal or starry heaven, and the planetary heaven.

HEAVEN, among divines, called the empyrean, is the abode of God, and blessed spirits, such as angels, and the souls of the righteous deceased. This in scripture is frequently called the kingdom of heaven, the heaven of heavens, the third heaven, Paradise, the New Jerusalem, &c.

HEAVEN, in astronomy, called the æthereal and starry heaven, is that immense region where the stars, planets, and comets are ranged. It is vulgarly called firmament, though, the original word used by Moses, when speaking of the second day's creation, properly signifies no more than expanse, a term adapted to the impression which the heavens make on our senses; whence in other parts of scripture the heaven is compared to a curtain or tent to dwell in. Descartes, Kircher, &c. have easily demonstrated this heaven not to be solid, but fluid, though they still suppose it full, without any vacuity, and cantoned out into so many vortices.

Sir Isaac Newton has abundantly shewn the heavens, to be void of all resistance, and consequently almost all matter, from the planets persisting in their motions without any sensible diminution of their velocity, and the comets passing freely in all directions. The ancient astronomers assumed as many heavens, as they observed different motions therein: all which they supposed solid and spherical. Thus, there were seven heavens for the seven planets; the eighth was for the fixed stars which they called firmament: Ptolemy added a ninth which he called the primum mobile. King Alphonsus added two crystalline heavens, to account for some irregularities in the heavenly motions; and, lastly, an Empyrean heaven was drawn over the whole for the residence of the Deity. The crystalline heavens were supposed to have no stars fixed in them; they encompassed the inferior, starry, and planetary heavens, communicating their motion thereto. The first served to account for that slow motion of the fixed stars, whereby they advance a degree eastward in seventy years: whence the precession of the equinoxes. The second was to solve the phenomena of libration or trepidation. Eudoxus supposed 23 heavens, Calippus thirty, Regiomontanus 33, Aristotle 47, and Fracastor 70. The astronomers did not much concern themselves about the reality of these heavens, provided they served to account for any of the celestial motions, and agreed with phenomena.

HEBDOMADARY, *Hebdomadarius*, a member of a chapter or convent, whose week it is to officiate in the choir, &c.

HEBRAISM, an idiom or peculiar manner of expression in the Hebrew language.

HEBREW Character. Of this there are two kinds; the ancient called the square, and the modern or rabbinical characters somewhat rounded. The former stand more square than the other, and are the characters used in the text of the scriptures, &c. and the latter are used for the gloss or comment.

HEBREW Language, or HEBREW, that formerly spoken by the Jews, in which all the books of the Old Testament are written, hence called the sacred language.

There



There is no piece wrote in pure Hebrew besides these, and even some parts of those are in Chaldee. So that Hebrew is the most ancient language, so far as we know. The Hebrew has but one simple conjugation; but this is varied in each verb seven or eight ways, which has the effect of so many different conjugations, and under one word affords a great number of expressions whereby to represent all the different modifications of a verb, which, in the modern and most of the learned languages, are expressible only by phrases. The original words in Hebrew, called roots, rarely consist of more than three letters, or two syllables, expressed by two sounds, or the same sound redoubled and indicated by a point. The Hebrew has twenty-two letters, which are divided into guttural, palatal, dental, labial, and lingual. There are only five vowels in the Hebrew, the same with ours; but each is subdivided into two, a long and a short. To these ten or twelve vowels must be added others called semi-vowels, which are only to connect the consonants, and make the easier transition from one to the other. There are about forty different accents in the Hebrew, the use of several of which is not well ascertained. In general they serve, 1. To distinguish the sentences and the members thereof, like the points, &c. in English; 2. To determine the quantity of the syllables: and, 3. To mark the tone wherewith they are to be sung or spoken.

*Rabbinical* HEBREW, or modern Hebrew, that used by the Rabbins in their compositions. The basis of this is the Hebrew and Chaldee, with divers alterations therein, the meaning of which they have very much enlarged. They have borrowed several things from the Arabick; the rest chiefly from the Greek, Latin, and modern tongues, particularly that spoke in the place where each Rabbin wrote. M. Simon, observes in his Hist. Crit. that the Rabbins have translated most of the ancient philosophers, mathematicians, astronomers, and physicians; they do not want even orators and poets, and have wrote on most subjects themselves.

HECATOMB, *Hecatombē*, in antiquity, a sacrifice of a hundred oxen, at as many altars, and by as many priests. The ancients tell us, that Pythagoras sacrificed a hecatomb to the Muses, for their assistance in discovering the demonstration of the 47th proposition of Euclid's first book.

HECTICK, or HECTICK FEVER, a kind of slow fever, occasioned by exulcerations of the lungs, and the purulent matter mixing with the blood, and disturbing its natural motion. The symptoms are an unusual heat in the palms of the hands, a redness of the cheeks, especially after eating; also a weak, but quick pulse, a languid habit of body, and loss of strength.

It is of the utmost consequence, says Dr. Mead, to attempt the cure of this dreadful disease early; and as it arises from inflammations, it requires repeated bleedings. Dr. Pringle recommends the same practice, with the use of setons and issues, made in the side that is most affected. He observes, that he found nothing diminish the hectick fits so much as small but repeated bleedings, especially when saline draughts and a cooling diet are taken at the same time. In thirst, heat, and other symptoms, the signs of a putrid state of the humours, the ptisan is to be acidulated with the spirit of vitriol, and the aliments are to be chosen of the acescent kind. A mixture of equal parts of barley-water and sweet milk, seasoned with sugar and nutmeg, makes a proper and an agreeable part of diet; and in case of costiveness, let the patient drink a decoction of bran with raisins and liquorice. Colliquative sweats are most safely checked by lime-water, whereof the patient may drink about a pint a day, softened with a little new milk.

A milk-course, though much recommended by physicians, as having the double advantage of being food and physick, ought to be taken with caution; not only because some people have a natural aversion to milk, but because in head-achs, acute fevers, flatulencies, bilious loosenesses, and bloody stools, it is found to be very prejudicial. The preference is generally given to asses-milk, as being most cooling and detergent; but when it can be conveniently had, whey made of cows-milk, or even of goats, may be substituted in its room, especi-

ally if the goats have been fed on fragrant herbs. In case the milk does not agree with the stomach, as frequently happens, it should be medicated in the following manner: take of red roses dried, of balaustines, pomegranate-rind, and cinnamon, each one dram, and boil them in a pint of cows-milk: when the decoction begins to boil, pour a little cold water into it, to make it subside. Repeat this process several times, and lastly strain off the liquor, sweeten it with sugar, and set it by for use.

Others recommend equal quantities of milk and an infusion of male speedwell, sow-thistle, sage of Jerusalem, liverwort, colts-foot, ground-ivy, maiden-hair, flowers of St. John's wort and roses, with a little sugar, a few drops of oil of tartar per deliquium: this must be drank pretty warm, and continued for six weeks. But above all, fresh butter-milk is said to be the most efficacious specific.

Medicines that are gently corroborating are also useful: such are the solution of coral, or mother of pearl, in orange-juice; cortex eleutherii, or peruvian bark, made into an electuary with sirup of lemons. Heister affirms he has cured many of these fevers with the bark, in a few days. But above all things, riding daily must not be forgot, as being the best kind of exercise, and highly beneficial in these distempers.

Hecticks attack children sometimes from voracity, and at others from refrigeration of the body; in which cases the use of the temperate baths of sweet water, continued for some time, is said to be of great service; and to remove the obstructions of the mesenterick glands and vessels, the frequent but sparing use of the following saline aperient mixture will be necessary: take of salt of tartar, nitre, and arcanum duplicatum, each two drams; sal ammoniac, three drams: mix them all together, and let a little of the mixture be put into the child's drink, according to his age and strength.

HEDGE, in agriculture, a fence inclosing a field or garden, made of boughs or bushes, interwoven together.

*Quickset* HEDGE, that made of live trees in contradistinction to that made of stakes or dry boughs.

Mortimer directs that the sets of a thorn quickset hedge, &c. be as big as one's thumb, cut between four and five inches off the ground; if it has a ditch, that it be three feet wide at top, one foot at bottom and two feet deep: that, if the hedge be without a bank or ditch, the sets be in two rows, almost perpendicular, and a foot asunder; that the turf be laid within the grassy side downwards; and, at every thirty feet distance, a young oak, elm, crab, &c. be placed; that stakes be drove into the loose earth, about two feet and a half distance, down to the firm ground.

When the hedge is about nine years growth, it may be splashed, by giving the shoots a cut half through, and then weaving it about the stakes, and trimming the superfluous branches.

Instead of a north-east wall to a garden, Lawrence advises to plant a crab-tree hedge of three rows, which will be a good defence against the winds from those quarters which blow two parts in three of the whole year, besides the stock of fruit such a hedge will yield.

Hedges for ornament in gardens are sometimes planted with ever-greens; in which case the holly is preferable to any other. Next to this, most people prefer the yew; but the dead colour of its leaves renders those hedges less agreeable. The laurel is one of the best greens, but the shoots are so luxuriant that it is difficult to keep it in any tolerable shape; and as the leaves are large to prevent the disagreeable appearance given them by their being cut through with the sheers, it will be the best way to prune them with a knife, cutting the shoots just down to a leaf. The laurustinus is a very fine plant for this purpose; but the same objection may be made to this as to the laurel; this, therefore, ought only to be pruned with a knife in April, when the flowers are going off; but the new shoots of the same spring must by no means be shortened. The small leaved and rough-leaved laurustinus are the best plants for this purpose. The true phillyrea is the next best plant for hedges, which may be led up to the height of ten or twelve feet, and if they are kept narrow at the top, that there may not be too much width for the snow



to lodge upon them, they will be close and thick, and make a fine appearance. The ilex, or ever-green oak, is also planted for hedges, and is a fit plant for those designed to grow very tall. The deciduous plants usually planted to form hedges in gardens are, the hornbeam, which may be kept neat with less trouble than most other plants. The beech, which has the same good qualities as the horn beam; but the gradual falling of its leaves in winter cause a continual litter. The small-leaved English elm is a proper tree for tall hedges, but these should not be placed closer than eight or ten feet. The lime-tree has also been recommended for the same purpose; but after they have stood some years they grow very thin at bottom, and their leaves frequently turn of a black disagreeable colour.

Many of the flowering shrubs have also been planted in hedges, such as roses, honeysuckles, sweet-briar, &c. but these are difficult to train; and if they are cut to bring them within compass, their flowers, which are their greatest beauty, will be entirely destroyed.

HEEL, in anatomy, the hind part of the foot. See the article FOOT.

HEEL of a Horse, the lowest and hind part of the foot between the quarters and opposite to the toe. It should be high, large, and even on the pastern. Horses are incident to scabbed heels and scratches.

HEEL, in the sea-language. If a ship leans on one side, whether she be a-ground or a-float, then it is said she heels a-starboard, or a-port; or that she heels off-wards, or to the shore; that is, inclines more to one side than to another.

HEEL of the Mast, that part of the foot of any mast, which is pared away slanting on the aftward side thereof, in order that it may be stayed aftward on. The heels of the top-masts are square.

HEGIRA, in chronology, a celebrated epocha among the Arabs and Mahometans. The event which gave occasion to this epocha was Mahomet's flight from Mecca; the magistrates of this city, fearing this impostor might raise a sedition, expelled him on the 15th or 16th of July A. D. 622. being the 14th year of his assuming the character of prophet, and under the reign of the emperor Heraclius. There is an earlier hegira in the same year, when Mahomet and his disciples relinquished Medina. Both these hegiras the Mahometans call hegiran. The years of the hegira consist only of 354 days. To find what Julian year, a given year of the hegira corresponds to, reduce the year of the hegira given into days by multiplying by 354, divide the product by 365, and from the quotient subtract as many days as there are four years in the quotient for the intercalations, and to the remainder add 622.

HEIGHT, the third dimension of a body with regard to its elevation above the ground. See ALTITUDE and ELEVATION.

HEIR, *Hæres*, in the civil law, whoever succeeds to the estate and effects of another, either by right of blood or testament. There are two principal kinds of heirs, apparent and presumptive; the former are such on whom the succession is so settled that they cannot be set aside without infringing it. Presumptive heirs are the next relations, or heirs at law to any person, who, it is presumed, will be heirs, unless a contrary disposition of the testator prevent them.

HEIR, in common law, he who succeeds by right of blood to any man's lands or tenements in fee only. Every heir, having lands by descent, is bound by the acts of his ancestors, if he be named, because *qui sentit commodum sentit debet & onus*. Moveable or immoveable chattels are given by testament as the testator pleases; otherwise the ordinary may distribute them as he in conscience likes best.

HEIRESS, a female heir.

HEIR-LOOM, in law, are such household furniture as is not inventoried after the owner's decease, but necessarily descends to the heir along with the house; such are tables, presses, cupboards, bedsteads, &c. these in some countries accrue by custom, not by common law, to the heir.

HELEPOLIS, in antiquity, a kind of machine for battering down the walls of a place. It was no more

than the battering ram, with a covering over it to prevent its being set on fire, and to screen the men therein. See Battering RAM. Demetrius is said to be the inventor of the helepolis and divers other warlike engines: for which reason, and the number of cities he took thereby, he was denominated Poliorcetes, or city-taker.

HELIACAL, in astronomy, a term applied to the rising or setting of the stars, or, more strictly speaking, to their emergence out of and immersion into the rays and superior splendor of the sun.

A star is said to rise heliacally, when after having been in conjunction with the sun, and on that account invisible, it comes to be at such a distance from him, as to be seen in the morning before sun rising; the sun, by his apparent motion, receding from the star towards the east; on the contrary, the heliacal setting is when the sun approaches so near a star, as to hide it with his beams, which prevent the fainter light of the star from being perceived, so that the terms apparition and occultation would be more proper than rising and setting.

All the fixed stars in the zodiack, as also the superior planets, Mars, Jupiter, and Saturn, rise heliacally in the morning, a little before sun-rising, and a few days after they have set cosmically. Again, they set heliacally in the evening, a little before their achronical setting. But the moon, whose motion eastward is always quicker than the apparent motion of the sun, rises heliacally in the evening after the new moon; and sets heliacally in the morning, when old and approaching to a conjunction with the sun. The inferior planets, Venus and Mercury, which sometimes seem to go westward from the sun, and sometimes again have a quicker motion eastward, rise heliacally in the morning, when they are retrograde; but when direct in their motions, they rise heliacally in the evening. The heliacal rising or setting of the moon happens when she is  $17^{\circ}$  distant from the sun; but for the other planets  $20^{\circ}$  are required; and for the fixed stars, more or less according to their magnitude.

HELIANTHUS, the great sun-flower, in botany, a genus of plants, whose flower is compound and radiated; on the disk is placed a multitude of hermaphrodite cylindraceous florets; the rays are composed of a very few long, spear-shaped, ligulated, female ones; the stamina are five curved filaments, topped with cylindraceous antheræ; the seeds are solitary, oblong, tetragonal, and contained in the cup; the flowers are all yellow, and often more than a foot in diameter. This genus is the same as the corona solis of other authors, and includes the Jerusalem artichoke, which is a species of it.

HELICE, in astronomy. See URSA.

HELIOCENTRICK Place of a Planet, that place or point in the ecliptick, wherein a planet would appear to a spectator placed in the centre of the sun.

The word is Greek, and compounded of  $\eta\lambda\iota\omicron\varsigma$ , the sun, and  $\kappa\epsilon\upsilon\tau\rho\omicron\nu$ , a centre.

The heliocentrick place is the same with the longitude of a planet viewed from the sun.

HELIOCENTRICK Latitude of a Planet, the latitude it would appear in at any time to a spectator placed in the sun.

HELIOCOMETES, a phenomenon sometimes observed about sun-setting, being a large luminous tail, or column of light, proceeding from the body of the sun, and dragging after it, not unlike the tail of a comet; whence the name.

HELIOSCOPE, in opticks, a sort of telescope peculiarly adopted for observing the spots, eclipses, &c. of the sun. There are various apparatuses of this kind: Dr. Hook recommends four reflecting glasses placed in the tube, whereby the force of the rays will be so weakened, as only to strike the eye with a 256th part of their force; and this he prefers to all others.

M. Huygens only blackens the inside of the eye-glass of the telescope, by holding it over the flame or smoke of a lamp, &c. or rather he blackens a piece of plain glass, and holds it between the eye and the object-glass; or, which is best of all, he claps the smoked glass to another, with a rim of thick paper between to keep the



black from rubbing off, and fits the two into a frame, to be applied between the eye and the eye-glass. But the best method of viewing this luminary, is by the solar telescope. See *Solar Telescope*.

**HELIOSTATA**, in opticks, an ingenious instrument invented by the learned Dr. s'Gravesande; so called from its use, which is to fix, as it were, the rays of the sun in an horizontal direction across the dark chamber, all the while it is in use.

The word is formed from the Greek, *ἥλιος*, the sun, and *σταίω*, to stop or fix.

**HELIOTROPIUM**, turnsole, in botany, a genus of plants whose flower is monopetalous and saucer-shaped; the tube is the length of the cup; the limb is plane, divided lightly into five segments and obtuse: the smaller segments stand alternate and are acute; the larger are placed between: the mouth is closed by five prominent squamulæ, joined in the form of a star; there is no pericarpium, the calyx remains unaltered, and contains four oval accumulated seeds.

A decoction of common turnsole purges phlegm and bile. It is good against the sting of serpents: the leaves are said to take away warts, ulcers, gangrenes, and scrophulous tumours.

**HELIX**, in geometry, the same with a spiral line.

**HELIX**, in architecture. Some distinguish between it and spiral. Daviler says a staircase is helical, when the steps wind round a cylindrical newel; whereas the spiral winds round a cone, continually approaching nearer its axis. Helix also denotes, in architecture, the cauliculus or little volutes under the flower of the Corinthian capital, called likewise urillæ.

**HELIX**, in anatomy, the external circle or border of the ear, in contradistinction to the inner protuberance corresponding thereto, called the anthelix. See *EAR*.

**HELL**, a place of punishment, wherein the wicked are to receive the reward of their evil deeds, after this life. In this sense, *hell* stands opposed to heaven. See the article *HEAVEN*.

Among the ancients, *hell* was called *ταρταρος*, *ταρταρα*, *Tartarus*, *Tartara*; *Ἅδης*, *Hades*, *Infernus*, *Inferna*, *Inferi*, &c.—The Jews, wanting a proper name for it, called it *Gehenna*, or *Gebinnon*, from a valley near Jerusalem, wherein was Tophet, or a place where a fire was perpetually kept.

Divines reduce the torments of *hell* to two kinds, *pœna damni*, the loss and privation of the beatific vision; and *pœno sensus*, the horrors of darkness, with the continual pains of fire inextinguishable.

Most nations and religions have their notions of a *hell*.—The *hell* of the poets is terrible enough: witness the punishment of Tityus, Prometheus, the Danaids, Lapithæ, Phlegyas, &c. described by Ovid in his *Metamorphosis*.—Virgil, after a survey of *hell*, *Æneid*. Lib. vi. declares, that had he a hundred mouths and tongues, they would not suffice to recount all the plagues of the tortured.—The New Testament represents *hell* as a lake of fire and brimstone; and a worm which never dies, &c. Rev. xx. 10, 14, &c. Mark ix. 43, &c. Luke xvi. 23, &c.

**HELL**, *Ἅδης*, *hades*, is sometimes also used, in the scripture style, for death or burial; by reason the Hebrew and Greek names signify sometimes the place of the damned, and sometimes simply the grave.

**HELLEBORUS**, **HELLEBORE**, in botany, a genus of the polyandria polygamia class. It has no calyx; the petals are five or more; the nectarium is tubular and bilabiate; and the capsule contains many seeds. There are five species, two of them natives of Britain, viz. the fœtidus, or great bastard black hellebore; and the viridis, or wild black hellebore. The hellebore, when taken in large quantities, is poisonous; but the root, in small doses, is supposed to attenuate the humours, and to promote urinary and uterine discharges.

**HELLENISTICK**, or **HELENISTICK LANGUAGE**, that used by the Grecian Jews who lived in Egypt and other parts where the Greek tongue prevailed. In this language it is said the Septuagint was written, and also the books of the New Testament; and that it was thus denominated to shew that it was Greek filled with Hebraisms and Syriacisms.

VOL. I. No. 38.

**HELM**, among seamen, implies a large piece of thick board, hung upon googings bolted into the stern-post of a ship, upon which it revolves, and by its motion directs the course of the ship at sea. The helm is composed of two or three parts, viz. the rudder, the tiller, and the wheel; this last part however is seldom used but in men of war, and the largest merchant ships. The rudder is that part of the helm which is hung on the outside of the stern-post, as before described: in the top of the rudder there is a mortice cut, into which is firmly bolted the tiller, which is a piece of timber thrust into the rudder to turn it; and, lastly, the wheel is employed to move the tiller with greater facility from one side to the other, in directing the ship.

**HELMET**, an ancient defensive armour worn by horsemen, both in war and in tournaments. It covered both the head and face, only leaving an aperture in the front secured by bars, which was called the visor.

**HELONIAS**, in botany, a genus of plants, whose flower consists of six oblong equal petals, with the same number of stamina. The fruit is a roundish capsule, having three cells, each containing a roundish seed.

**HELVE**, a term used among country people for the handle of a hatchet, pick-ax, mattock, or the like.

**HEMERODROMI**, in Grecian antiquity, centinels and guards appointed for the security and preservation of cities and other places.

**HEMICRANIA**, in medicine, a species of headache, wherein only one half or side of the head is affected.

**HEMICYCLE**, in architecture, is defined by Daviler to be an arch forming a perfect semicircle. See *ARCH* and *BRIDGE*.

To construct such an arch of hewn stone, they divide the semicircle into a certain number of equal parts, and fashion an equal number of vousoirs, which will complete the arch: however, that there may be no joint in the middle, where the key-stone should be, they always take care that the number of vousoirs be an odd one.

**HEMICYCLIUM**, in antiquity, a part of the orchestra in the ancient theatres.

**HEMICYCLIUM** also signified a kind of sundial, being a concave semicircle, the upper cusp of which looked to the north. On the middle of the hemicycle stood a style, whereof the point that corresponded to the centre of the hemicycle, represented the centre of the earth; and its shadow, being projected on the concavity of the hemicycle, which represented the space between the two tropicks, pointed out not only the declination of the sun, and the day of the month, but likewise the hour of the day.

**HEMINA**, in Roman antiquity, a liquid measure, which, according to Arbuthnot, was equal to half a wine pint English measure; its contents being 2,818 solid inches. See *MEASURE*.

**HEMISPHERE**, *Hemispherium*, in geometry, the half of a globe or sphere, when divided into two by a plane passing through its centre. The centre of gravity of a hemisphere is five eighths of the radius distant from the vertex. It is proved in opticks, that a glass hemisphere unites the parallel rays at the distance of a diameter and one-third of a diameter from the pole of a glass.

**HEMISPHERE**, in astronomy, particularly denotes one half of the mundane sphere. The equator divides the sphere into two equal parts, called the northern and southern hemispheres, having the north and south poles in their respective zeniths. The horizon also divides the sphere into two hemispheres, the upper and lower, having the zenith and nadir in their respective vertices.

**HEMISPHERE** also denotes a projection of half the terrestrial globe, or half the celestial sphere on a plane, and is frequently called planisphere.

**HEMISPHEROIDAL**, in geometry, an appellation given to whatever approaches to the figure of an hemisphere, but is not exactly so.

**HEMISTICH**, *ἡμιστίχον*, in poetry, denotes half a verse, or a verse not completed.

Of this there are frequent examples in Virgil's *Æneid*; but whether they were left unfinished by de-



sign or not, is disputed among the learned: such are, *Fir-o accincta vocat*, Æ. II. v. 614. And, *Italiam nan sponte lequor*, Æ. IV. v. 361.

In reading common English verses, a short pause is required at the end of each hemistich, or half verse.

HEMITONE, in the ancient musick, what we now call a half note or semitone.

HEMITRITÆUS, in medicine, a kind of fever, denoting the same as semi-tertian, returning twice every day.

HEMLOCK, *Cicuta*, in botany. See *CICUTA*.

HEMP, *Cannabis*, in botany, a very useful plant for making cordage and all things of that kind. The stalks of hemp grow to be five or six feet high, angular and covered with a strong tough bark; and cloathed with many digitated leaves, each composed of five, six, or seven parts, long and narrow, sharp-pointed and serrated about the edges, the middlemost being longest, set together upon one foot-stalk; they are green above and hoary underneath, and rough in handling. The flowers, in that they call the male, grow towards the top of the stalk in bunches, small and staminous; which perish without bringing any seed, which is produced by the female without any previous flowers.

The raising and dressing of hemp scarcely differs from the raising and dressing of flax, but in the following particulars.

Hemp requires a light, free, dry, dusty, and even a sandy warm soil; which if not naturally rich, must be made so by manure. New broke up ground does not answer for hemp, producing it thin and poor upon the stalk. Hemp does well to follow beans. The ground should be ploughed and harrowed three or four times, a fortnight or three weeks intervening between each time. In some parts of Lincolnshire and Holland the soil is naturally so free and rich, that it will produce hemp constantly year after year without manure. The leaves which fall off the stalk help to manure the ground. It is frequently sown with a view to clear the ground of weeds; which it does most effectually, growing fast, and soon checking every weed but mugwort, which is picked out with a fork.

It is sown about the first of May: so thin, that about three bushels are sufficient for an English acre; and the ground must then be covered as much as possible to preserve the seed from the birds, who are very fond of it. The taper-topped stalk which does not bear the pods, is called the female, though in fact it is the male, scattering from its bloom a small dust, which impregnates the pods of the bushy-topped; which last is commonly, though improperly, called the male or karle-hemp. When hemp is the object of the farmer more than a crop of seed, the whole should be pulled when the stalk begins to grow yellow, and the earth remaining about the roots should be beat off to prevent more growth: but if the seed is wanted in its greatest perfection, the stalks bearing the pods must be pulled before the upmost pod begins to open; the earth should not be beat off from the roots; it should be cocked in sheaves upon the field, to dry as corn; and the top of these cocks should be covered with undergrowth, or the like, to preserve the seed from the birds. Hemp is sooner watered than flax, and the canals must be deeper. In keeping the seed, care must be taken to preserve it from rats, mice, and such like vermin, who are all fond of it. It is dressed as coarse flax, but is sooner dressed; and its greater length requires more care, and renders it more troublesome in the handling, especially in the skutching of it by the water lint-mills with horizontal skutchers, when it must be folded double. What is too coarse and strong in the stalk for the hand or foot machines, may be broke and peeled by the hand. See *FLAX*.

HEN, *Gallina*, in ornithology, though used in a general sense to signify any female bird, is more particularly restrained to those of the order of gallinæ.

HEN-BANE, a plant called by botanists hyosciamus. See the article *HYOSCIAMUS*.

HENDECAGON, in geometry, a figure that hath eleven sides, and as many angles.

In fortification, hendecagon denotes a place defended by eleven bastions.

HEN-MOULD, among farmers, denotes a black spongy soil, fitter for grazing than for corn. In some places, indeed, they give the name of hen-mould to a rich black earth mixed with whitish streaks, which is exceeding fertile.

HENOTICON, in church history, a decree or edict of the emperor Zeno, made at Constantinople, in the year 482, by which he pretended to reconcile all parties under one faith.

HENTING, among farmers, a method of sowing immediately before the plough, by which, it is pretended, a great deal of charge is saved. See *PLOUGHING*.

HENTING FURROWS, those turned from each other at the bottom, in ploughing ridges. See *PLOUGHING*.

HEPAR, the liver, in anatomy. See *LIVER*.

HEPATICK, in medicine and anatomy, any thing belonging to the liver.

HEPATICK ALOES. See *ALOES*.

HEPATICA, noble liverwort, in botany, a low plant without any other stalk than the pedicles of the leaves and flowers; the leaf is cut, not very deep, into three lobes, entire about the edges; the flower is commonly blue, sometimes redish or white, hexapetalous, set in a three-leaved cup, with numerous stamina in the middle, which are followed by a cluster of whitish seeds. It is perennial, grows wild on gravelly shady grounds in Germany and other parts of Europe, and flowers in our gardens in March, or sooner.

This herb is a mild astringent and corroborant; in which intentions, infusions of it have been drank as tea, or the powder of the dry leaves given to the quantity of half a spoonful at a time.

HEPATICA, is also a species of moss, consisting of numerous obtuse lacinated leaves, lying over one another, marked on the surface with white tubercles reticularly disposed through the green substance of the leaf, shooting out underneath fine capillary roots: from the extremities of the leaves issue clear whitish pedicles, bearing globular bodies, which when ripe contain black minute seeds like dust. It is perennial, grows on moist stony places, and runs up to seed in March or April.

This moss is recommended as an aperient, resolvent, and purifier of the blood. From the penetrating, though mild, pungency and bitterishness of its taste, sinking as it were into the tongue, it promises to be a plant of no inconsiderable virtue, though it is at present disregarded.

HEPATITIS, in medicine, an inflammation of the liver, with an imposthume of that organ.

HEPATOSCOPIA, in antiquity, that branch of divination which predicted future events, by inspecting the entrails of animals, but especially the liver.

HEPHÆSTIA, in Grecian antiquity, an Athenian festival in honour of Vulcan, the chief ceremony of which was a race with torches. It was performed in this manner: the antagonists were three young men, one of whom, by lot, took a lighted torch in his hand, and began his course; if the torch was extinguished before he had finished the race, he delivered it to the second; and he, in like manner, to the third: the victory was his, who first carried the torch lighted to the end of the race: and to this successive delivering of the torch, we find many allusions in antient writers.

HEPTAGON, in geometry, a figure consisting of seven sides, and as many angles. In fortification, a place is termed an heptagon that has seven bastions for its defence.

HEPTAGONAL NUMBERS, in arithmetick, a sort of polygonal numbers, wherein the difference of the terms of the corresponding arithmetical progression is 5. One of the properties of these numbers is, that if they be multiplied by 40, and 9 be added to the product, the sum will be a square number.

HEPTANGULAR, in geometry, an appellation given to figures which have seven angles.

HEPTARCHY, a government of seven persons: also a state or country divided into seven kingdoms, and governed by seven independent princes; in which sense it is particularly applied to the government of South Britain, when divided amongst the Saxons.

HEPTATEUCH, the seven first books of the Old Testament,



**Testament**, containing the pentateuch, or five books of Moses, and the books of Joshua and Judges.

**HEPHTHEMIMERIS**, in ancient poetry, a verse consisting of three feet and an half, or seven half feet. It likewise denotes a cæsura after the third foot of a verse.

**HERACLEONITES**, a sect of Christians, the followers of Heracleon, who refined upon the gnostick divinity, and maintained that the world was not the immediate production of the Son of God, but that he was only the occasional cause of its being created by the demiurgus. The Heracleonites denied the authority of the prophecies of the Old Testament, maintaining that they were mere random sounds in the air; and that St. John the Baptist was the only true voice that directed to the Messiah.

**HERACLIDÆ**, or *Return of the HERACLIDÆ*, the descendants of Hercules, into *Peloponnesus*, in chronology, a famous epocha, that constitutes the beginning of profane history; all the time preceding that period being accounted fabulous. This return happened in the year of the world 2862, an hundred years after they were expelled, and eighty after the destruction of Troy.

**HERALD**, an officer at arms, whose business it is to declare war, to proclaim peace, to marshal all the solemnities at the coronation, christening, marriage, and funeral of princes; to blazon and examine coats of arms, &c.

The three chief heralds are called Kings at Arms, the principal of which is Garter; the next is called Clarencieux, and the third Norroy; these two last are called provincial heralds. Besides these, there are six other inferior heralds, viz. York, Lancaster, Somerset, Richmond, Chester, and Windsor; to which, on the coming of king George I. to the crown, a new herald was added, styled Hanover herald; and another, styled Gloucester king at arms. The kings at arms, the heralds, and four pursuivants, are a college or corporation, erected by a charter granted by Richard III. by which they obtained several privileges, as to be free from subsidies, tolls, and all troublesome offices.

**HERALDRY**, the knowledge of what relates to the bearing of arms, the laws and regulations thereof, and likewise the marshalling solemn cavalcades, processions, coronations, instalments, creations of peers, funerals, nuptials, &c.

A coat of arms is often a publick testimony of the merit of a family, and a strong motive to virtuous actions. The custom of bearing arms is very ancient, being originally derived from the practice of engraving or painting devices upon the shields, targets, banners, &c. peculiar to military men.

There is scarce a nation in the universe but very anciently appropriated something of devices to themselves, by which they were distinguished from other people. Nor were these marks of distinction confined to nations, but tribes, families, and particular persons had their badges, by which they were known from the rest of mankind.

After a long time these honourable marks of distinction became the peculiar privilege of sovereigns, &c. who bestowed them on persons of merit, as publick rewards of their good services.

It appears from the best authors, that the arms of houses, as well as the double name of families, were not known before the year one thousand; and several have endeavoured to prove, that the use of arms did not begin till the Croisades of the Christians. It was the ancient tournaments that fixed the use of armouries. Henry the Fowler, who regulated the tournaments in Germany, was the first who introduced these marks of honour, which appear of older standing in Germany than any other part of Europe. Such of the nobility and gentry as crossed the seas in the expeditions to the Holy-land, also, assumed these tokens of honour to distinguish themselves. Before these times we find nothing upon ancient tombs but crosses with Gothick inscriptions, and representations of the deceased. The history of Geoffry, count of Anjou, and son of Foulques, written by a monk of Marmoutier, is the most ancient mo-

nument which makes mention of a coat of arms; nor do they appear on any coins before the year 633. We meet with figures, it is true, much more ancient, both in standards and medals, but neither cities nor princes ever had arms in form. Originally, none but the nobility had a right of bearing arms. But Charles V. having, by charter in 1371, permitted the Parisians to bear arms, from their example the more eminent citizens of other places did the like. Camden refers the original of hereditary arms in England to the first Norman kings, and their use, he says, was not established till the reign of king Henry III. and instances several of the most considerable families in England; wherein from that time the son always bore different arms from the father. At the same time it became the custom for private gentlemen to bear arms, borrowing them from the lords, of whom they held in fee, or to whom they were most devoted. Arms at present follow the nature of titles, being hereditary, and distinguishing families and kindred, as names do persons and individuals.

It is a rule that, the more simple and the less diversified the arms are, the more noble and ancient. Full and entire arms are such as retain their primitive purity, without alterations, diminutions, or abatements. The arms of princes of the blood, all younger sons, &c. are not pure and full.

**HERB**, in pharmacy, an appellation given to the stalks and leaves of plants, especially such as are fleshy and succulent, and die away every year; but is also frequently used to denote the leaves alone. The term herb, therefore, denotes the stalks and leaves, in contradistinction to the flowers, seeds, and roots.

**HERBAGE**, comprizes all kinds of herbs; it also signifies, in law, the green pasture provided by nature for the food of cattle: it is also used for the liberty a man hath of feeding his cattle in another man's ground, as in the forest.

**HERBAL**, a book describing the figure, genus, species, properties, virtues, &c. of herbs, trees, seeds, and plants. It also denotes a collection of specimens of the several kinds of plants, dried in the leaves of a book.

**HERBALIST**, a person conversant in plants, the same as botanist.

**HERCULES** in astronomy, one of the constellations of the northern hemisphere.

**HERCULEUS** *Morvus*, in medicine, the epilepsy; so called from the terror of its attacks and the difficulty of cure.

**HEREDITAMENTS**, in law, are such immoveable things as a man may have to himself and his heirs, by way of inheritance, or which, not being otherwise bequeathed, of course descend to the next heir of blood; and fall not to the executor or administrator, as chattels do. This word extends to whatever is inheritable, be it real, personal, or mixed; and in conveyances, by the grant of hereditaments, manors, houses, lands, rents, &c. will pass.

**HEREDITARY**, an appellation given to whatever belongs to a family by right of succession, from heir to heir.

**HERESY**, the crime of obstinately persisting in opinions that are contrary to the fundamentals of religion.

**HERETICK**, a general name for all such persons under any religion, but especially the Christian, as profess or teach religious opinions contrary to the established faith, or to what is made the standard of orthodoxy.

**HERISSON**, in fortification, a beam armed with a great number of iron spikes, with their points outwards, and supported by a pivot, on which it turns. These serve as a barrier to block up any passage, and are frequently placed before the gates, and more especially the wicket doors of a town or fortress, to secure those passages, which must of necessity be often opened and shut.

**HERMAPHRODITE**, one who partakes of both sexes. Most, if not all those reported to be Hermaphrodites, are probably no other than mere women, whose clitoris is grown to an exorbitant size, and whose



whose labia pudendorum become preternaturally tumid. The latest botanists and florists call a division of plants Hermaphrodites; and divers of the insect and reptile kind are also Hermaphrodites, particularly worms and snails.

HERMATHENA, in antiquity, a statue representing Mercury and Minerva both in one.

HERMERACLES, in antiquity, a statue compounded of the figures of Mercury and Hercules.

HERMES, or HERMA, in antiquity, a sort of square, or cubical figure, of Mercury, commonly made of marble, though sometimes of brass, without arms or legs, and placed by the Greeks and Romans in their cross-ways.

HERMETICK, or HERMETICAL *Art*, a name given to chymistry, on a supposition that Hermes Trismegistus was the inventor, or excelled therein. We know but little of this Hermes, only that he was an ancient king of Egypt, a thousand years before Æsculapius.

HERMETICAL *Philosophy*, that which undertakes to solve all the phenomena of nature from the three chymical principles, salt, sulphur, and mercury. A considerable addition was made to the ancient hermetical philosophy by the modern doctrine of Alkali and Acid.

HERMETICAL *Physick*, the art of healing as founded on the Hermetical philosophy.

HERMETICAL *Seal*, a method of stopping glass-vessels for chymical operations so very accurately, that nothing can escape. It is done by heating the neck of the vessel in the flame of a lamp, till it be ready to melt, and then twisting it close together with a pair of pincers. Vessels may likewise be sealed hermetically, by stopping them with a plug of glass well luted into the neck of the vessel; or by inverting another ovum philosophicum over that wherein the matter is contained.

HERMIT, EREMITA, or EREMIT, a devout person retired into a solitude, to be more at leisure for prayer and contemplation.

HERMITAGE, a small hut or habitation, built in some desert or solitary place, inhabited by a hermit.

HERMODACTYL, in pharmacy, the root of an unknown plant, brought from Turkey: of the shape of a heart flattened; of a white colour; compact and solid, yet easy to cut or powder. This root has a viscous, sweetish, farinaceous taste, and no remarkable smell. It was ranked by the ancients among the catharticks, but such as we now meet with in the shops does not appear to have any purgative virtue. Alpinus relates, that hermodactyls, the same with what are sold in Europe, are eaten by the Egyptian women, to the quantity of several roots at a time: that they do not move the belly, or produce any ill effect: that they are supposed to be very nutritious, and contribute to procure the fatness and plumpness there admired. Those who report them to be a purgative, have probably ascribed to the hermodactyls, a part of the effects of the substances which were joined to them; for, being acknowledged slow in operation, they have been commonly actuated with aloes and other catharticks; and have long been an entire stranger to practice.

HERNIA, in medicine, a preternatural tumour formed in the abdomen, particularly in the navel, inguen, and scrotum, by a protuberance of the intestines or omentum, and usually known by the name of rupture. These tumours differ first, according to their place or situation: those formed at the navel are called omphalocele, or exomphalus.

A hernia in the groin is called bubonocele, and that of the scrotum, oscheocele, &c. Hernias are also distinguished from the body or surface contained in, or forming, the tumour: when from a protuberance of the intestines, a hernia is termed enterocele; when from the omentum, epiplocele; if from flatulæ, pneumatocèle; and if from water, hydrocele, &c.

HERNIARIA, rupture-wort, in botany, a genus of the pentandria digynia class. The calix consists of five segments; it has no corolla; and the capsule contains one seed. There are four species, three of them natives of Britain, viz. the glabra, or smooth rupture-wort; the hirsuta, or rough rupture-wort; and the

lenticulata, or sea rupture-wort. The leaves may be used as a mild restraining; but have no title to their former reputation of curing ruptures.

HERO, in the ancient mythology, a great and illustrious person, of a mortal nature, though supposed by the populace to partake of immortality; and, after his death, placed among the number of the gods.

HERO is also used in a more extensive sense for a great, illustrious, and extraordinary personage; particularly in respect of valour, courage, intrepidity, and other military virtues. F. Bouhours makes this distinction between a hero and a great man, that the former is more daring, fierce, and enterprising; and the latter more prudent, thoughtful, and reserved. In this sense we say, Alexander was a hero, and Julius Cæsar a great man.

HERO of a Poem, or Romance, is the principal personage, or character therein. See CHARACTER.

The hero of the Iliad is Achilles; of the Odyssey, Ulysses; of the Æneid, Æneas; of Tasso's Jerusalem, Godfrey of Bulloign; of Milton's Paradise Lost, Adam: though Mr. Dryden will have the Devil to be Milton's hero, in regard he gets the better of Adam, and drives him out of paradise.

Many of the criticks find fault with the hero of the Æneid, for being too delicate, wanting the fire, firmness, and uncontrollable spirit, remarkable in the hero of the Iliad. Piety, tenderness, and submission to the gods, are virtues of the middle class of mankind; they do not strike enough for a hero who is to be the instrument of such notable exploits. In answer to this, P. Bossu observes, that Æneas's character was not to be formed on the model either of Achilles or Ulysses; nor to be of the same kind with them, as the fable and design of the Æneid were very different from those of the Iliad and Odyssey. Virgil's design was to persuade the Romans to receive a new form of government, and a new master; who must have all the qualities requisite for the founder of a state, and all the virtues which make a prince beloved.

HEROICK, something belonging to a hero, or heroine: thus,

HEROICK AGE, that age or period of the world wherein the heroes are supposed to have lived. The heroick age coincides with the epick poem. See EPICK.

HEROICK VERSE, that wherein heroick poems are usually composed; or it is that proper for such poems. In the Greek and Latin, hexameter verses are usually denominated heroick verses, as being alone used by Homer, Virgil, &c. See HEXAMETER.

Alexandrine verses of twelve syllables were formerly called heroick verses; but later writers use verses of ten syllables.

HEROINE, a woman of an heroick spirit, or who makes the principal personage in an heroick poem. See HERO and POEM.

HERON, in ornithology, a bird of the ardea-kind, with a hanging crest.

HERPES, in medicine, a bilious pustule, which breaking out in different manners upon the skin; accordingly receives different denominations. If they appear single, as they frequently do in the face, the base is inflamed, and the top pointed; and having discharged a drop of matter, the redness and pain go off, and they dry away. There is another sort more corrosive and of greater malignity, when a cluster of pustules rise in a ring, accompanied with smart, and sometimes with great itching; this species is termed serpigo, and vulgarly the tetter or ring-worm. Another kind of this disease appears in large clusters upon the neck, breast, loins, &c. attended with a slight fever and inflammation. The heads are white and mattery, which are succeeded by a small round scab resembling millet seed, whence its name, and vulgarly called shingles. See ERYSIPELAS.

HERRING, in ichthyology, a species of clupea, with the lower jaw longest, and without any black spots. It is from five to eight inches in length, and between one and two in breadth.

HERSE, in fortification, is a lattice or portcullice, made in the form of a harrow, and stuck full of iron spikes. It is usually hung by a rope, fastened to a moulinet,



moulinet, which is cut in case of a surprize, or when the first gate is broken with a petard, to the end that it may fall and stop up the passage of the gate, or other entrance of a fortress. These herfes are also often laid in the roads, with the points upwards, to incommode the march both of the horse and infantry.

HERSILLON, in the military art, a sort of beam, &c. between ten and twelve feet long, whose two sides, are full of spikes, to incommode both horse and foot. The word is a diminutive of the preceding.

HESPER, *Hesperus*, in astronomy, the evening star, Venus being so called when she sets after the sun.

The word is Greek, *Εσπερος*, the brother of Atlas, and father of the Hesperides.

HESPERIDES, in the ancient mythology, were the daughters of Hesperus; which were three in number, *Ægle*, *Arethusa*, and *Hesperethusa*.

HESPERIS, DAME'S VIOLET, in botany, a genus of the tetradynamia filiquosa class. The petals are obliquely bent; there is a gland betwixt the short stamina; and the stigma is forked at the base, and connivent at top. There are seven species, only one of which, viz. the matronalis, or unfavoury dame's violet, is a native of Britain.

HETEROCLITE, among grammarians, one of the three variations in irregular nouns, and defined by Mr. Ruddiman a noun that varies in declension; as *hoc vas*, *vasis*; *hæc vasa*, *vasorum*.

Other grammarians take the word heteroclite in a larger sense, applying it to all irregular nouns.

HETERODOX, in polemical divinity, something contrary to the faith or doctrine established in the true church, in contradistinction to orthodox.

HETERODROMUS *Vectis*, in mechanicks, a lever where the fulcrum or point of suspension is placed between the power and the weight, and where the weight is elevated by the descent of the power, and contrariwise. This is what we otherwise call a lever of the first kind. See LEVER.

HETEROGENEOUS, *heterogencal*, something that consists of parts of dissimilar kinds, in opposition to homogeneous; and these dissimilar parts are called heterogeneities.

HETEROGENEOUS, in mechanicks, is particularly applied to those bodies whose density is unequal in different parts of their bulk.

HETEROGENEOUS *Light*, that which consist of rays of different refrangibility, reflexivity and colour.

HETEROGENEOUS *Nouns*, in grammar such as are of one gender in the singular number, and another in the plural.

HETEROGENEOUS *Numbers*, are such as consist of integers and fractions.

HETEROGENEOUS *Quantities*, are those which are of such different kinds, as that one of them, taken any number of times, never equals nor exceeds the other.

HETEROGENEOUS *Surds*, such as have different radical signs, as  $\sqrt{2} a a$ ,  $\sqrt{5} b b$ ,  $\sqrt{3} 9$ ,  $\sqrt{7} 18$ , &c.

HETEROSCII, in geography, commonly denotes those inhabitants of the earth in the temperate zones, whose shadow at noon is always projected the same way, either northward or southward.

Heteroscii however, strictly denotes those inhabitants, which during the whole year, have their noon-tide shadows projected different ways from each other. Thus the inhabitants of the northern temperate zone are heteroscii with regard to those of the southern. The inhabitants of the part of the torrid zone are heteroscii with regard to those of the rest, and to those of one of the temperate zones, except all the solstices: and even at that time, all of the torrid zone are heteroscii with regard to those of one of the temperate zones. But as the people of the torrid zone have their shadow now on this, and then on that side, they are called amphiscii.

HEXACHORD, in the ancient musick, a concord, called by the moderns a sixth. There is a greater and less hexachord; the greater consists of two greater tones, two less tones, and one greater semitone, which make five intervals: the less consists only of two greater tones, the less and two greater semitones. The proportion of

the former is as 3 to 5; and that of the other as 5 to 8.

HEXAEDRON, *Hexahedron*, in geometry, one of the Platonick or five regular bodies, being a solid consisting of six equal sides or faces, properly called a cube. The square of the side of a hexaedron is in a subtriple ratio to the square of the diameter of the circumscribed sphere. Hence the side of the hexaedron is to the side of the sphere it is inscribed in, as 1 to  $\sqrt{3}$ , and consequently incommensurable thereto.

HEXAGON, in geometry, a figure of six sides, and as many angles. If the sides and angles be equal, it is called a regular hexagon. The side of a regular hexagon inscribed in a circle is equal to the radius of that circle; hence a regular hexagon is inscribed in a circle, by setting the radius off six times upon the periphery: as 1 to 1.672, so is the square of the side of any regular hexagon to the area thereof nearly.

HEXAMETER, in the Greek and Latin poetry, a verse consisting of six feet.

The first four feet of an hexameter may be either dactyls or spondees; but the last foot should in strictness be a spondee, and the last but one a dactyl, as in Homer and Virgil.

HEXANDRIA, from *εξ* six, and *ανηρ* male, the name of the sixth class in the Linnæan system of botany, including all those plants whose flowers are hermaphrodite, and furnished each with six stamina or male parts. To this class belong the lilly, narcissus, tulip, asparagus, aloe, garlick, with several other genera.

HEXAPETALOUS FLOWERS, among botanists, are those whose corolla consists of six petals or flower leaves.

HEXAPLA, in church history, a work published by Origen, containing a part of the Old Testament in the original Hebrew, with several versions of it in six columns; from whence it was called hexapla, or the six-fold edition.

HEXASTYLE, in architecture, a building with six columns in front.

HIATUS properly signifies an opening, chasm, or gap; but it is particularly applied to those verses where one word ends with a vowel, and the following word begins with one, and thereby occasion the mouth to be more opened, and the sound to be very harsh.

HIBISCUS, in botany, a genus of plants, whose flower consists of a double persistent calyx, containing a quinquepetalous cordated corolla. This genus includes the malvaviscus of Dillenius, and the ketmia of Tournefort, a species of which is the well known shrub commonly called *athlæa frutex*.

HICCUP, or HICCUGH, *Singultus*, in physick, a spasmodick, convulsive, interrupted, and uneasy concussion of the diaphragm, and some of the parts affixed to it, made in inspiration, and accompanied with a sonorous explosion of the air through the mouth.

HIDE, the skin of beasts, but particularly applied to those large cattle, as bullocks, cows, horses, &c.

HIDE of Land, was such a quantity of land as might be plowed with one plough within the compass of a year, or so much as would maintain a family; some call it sixty, some eighty, and some an hundred acres.

HIDE-BOUND, among farriers, a distemper in horses, when the skin sticks so fast to the back and ribs, that the hand cannot separate one from the other without great difficulty; his body is at the same time lean, his back-bones stand up, his guts are for the most part deficient in moisture, and his dung dry, and more offensive than common. If a horse become hide-bound by hard riding and ill keeping, he may be cured by good keeping. If it be the effect of a fever, or some other disease, if that be cured which is the cause, the effect will cease; but if he has no fever upon him, and he is hide-bound only from lowness of blood and spirits, give him boiled barley, white-water, or the like; and when his flesh is raised, harden it with good oats, beans, and moderate exercise.

HIERACHIUM, HAWKWEED, in botany, a genus of the syngenesia polygamia æqualis class. The receptacle is naked; the calix is oval and imbricated; and the pappus is simple and sessile. There are 28 species, 8 of them natives of Britain. The leaves of the pilosella,



fella, or common creeping mouse-ear, are recommended as astringents.

**HIERACITES**, in church-history, Christian heretics in the third century, so called from their leader Hierax, a philosopher of Egypt; who taught that Melchisedeck was the Holy Ghost, denied the resurrection, and condemned marriage.

**HIERARCHY**, among divines, denotes the subordination of angels. See **ANGEL**.

**HIERARCHY** likewise denotes the subordination of the clergy, ecclesiastical polity, or the constitution and government of the Christian church, considered as a society.

**HIEROGLYPHICK**, a mystick figure or symbol, used among the ancient Egyptians, to conceal the secrets of their theology. Hermes Trismegistus is commonly esteemed the inventor of hieroglyphicks, which he first introduced into the heathen theology, whence they have been transplanted into the Jewish and Christian.

Hieroglyphicks are a kind of real characters, which not only denote, but in some measure express the things.

**HIEROMNEMON**, in the ancient Greek church, an officer who was to stand behind the patriarch at the sacraments, &c. and shew him the prayers, &c. he was to rehearse.

**HIEROPHANTES**, in antiquity, a priest among the Athenians, who was the chief person that officiated in the Eleusinia sacred to Ceres and Proserpine.

**HIEROPHYLAX**, an officer of the Greek church, who is keeper of the holy things, utensils, &c. the same with our sacrista or sexton.

**HIEROSCOPY**, *Hieroscopia*, a kind of divination performed by considering the victim and every thing that occurs during the sacrifice.

**HIGH**, is applied to the elevation of a body above the horizon or even the ground: it also denotes a person in power.

**HIGH**, in musick, is sometimes used in opposition to low, and sometimes in the same sense with acute, in opposition to grave.

**HIGH Dutch**, the German tongue in its greatest purity as spoken in Misnia, &c.

**HIGH Operation**, in chirurgery, a method of extracting the stone at the upper part of the bladder. See the article **LITHOTOMY**.

**HIGHNESS**. The kings of England and Spain had formerly no other title; the first till the time of James I. and the second till Charles V. The petty princes of Italy began to be complimented with highness in 1630. The duke of Orleans assumed the title of royal highness in 1631, to distinguish himself from the other princes of France. At present all the sons of crowned heads are addressed by royal highness.

**HILARODI**, in antiquity, a sort of poets among the Greeks, who went about singing little diverting songs, somewhat graver than the Ionick pieces.

**HILARO-TRAGEDIA**, a dramatick performance, partly tragick and partly comick. This and the hilarodia, Scaliger takes to be the same. From one Rhinthon, a comick poet of Tarentum, who was the inventor of this kind of poem, it was also denominated fabulæ Rhinthonica.

**HILUM**, among botanists, denotes the eye of a bean.

**HIN**, a Hebrew measure of capacity for things liquid, containing the sixth part of an epha, or one gallon two pints, or 2,533 solid inches, English measure.

**HIND**, a female stag in the third year of its age.

**HIND-CALF**, a male-hart or hind in the first year. She fawns in April or May.

**HINE**, or **HIND**, a husbandman's servant. Thus the person who oversees the rest, is called the master hine.

**HINGES**, the joints on which gates, doors, lids, folds of tables, &c. hang and turn in opening, shutting, or folding. They are of different denominations, as butts used by the joiners for hanging table-leaves, &c. Casement, for hanging casements upon dove-tails, and effes for light doors and lockers; garnet-crofs, for hanging large doors or heavy scuttles in ships; port, for hanging ship's ports; scuttle, particularly used for scuttles. Besides these there are many others of different forms and

uses, distinguished by different names, as casting, chest-black Lancashire, smooth-filed coach, desk, dozen ware long, dozen ware short, weighty long, weighty short, lamb's-heads, port-side Lancashire, side smooth-filed, side with squares, side with rising joints, Lancashire and smooth-filed stalls; beds, box, trunk of several kinds; screw, shutter, Lancashire joints, and Lancashire dozen-ware with hooks. Hinges of all kinds are prohibited to be imported.

**HIP**, or **HAW**, in the materia medica, is reputed attenuant and diuretick. There is a very pleasant conserve of hips kept in shops.

**HIP-SHOT**, a disorder in a horse, when he has sprained his haunches, so as to relax the ligaments that keep the hone in its proper place.

**HIPS**, in building, those pieces of timber placed at the corners of a roof: they are longer than the rafters, by reason of their oblique position, not being square in any angle, as rafters are but bevel at every one of them; and, as all rafters have but four planes, these commonly have five. Hips and sleepers are much the same; only the sleepers lie in the vallies, and join at top with the hips; but those surfaces which make the back of the hip are the undersides of the sleeper.

*Backs of a HIP*, are those two planes on the outside of the hip, which lie parallel, both in respect of their length and breadth, with the superficies of the adjoining side and end of the roof.

*HIP-Mould*, is with some the same as the back of the hip: others take it for the pattern commonly made of a piece of thin wainscot, by which the back and sides of the hip are set out.

*HIP-Roof*, in building, called also Italian roof, is a roof without any gable end, shred-head, or jerkin-head; which last are both gable and hip at the same end.

A hip-roof has rafters as long, and with the angles at the foot, &c. at the ends of buildings, as it has at the sides; and the feet of the rafters on the ends of such buildings stand on the same plane, and at the same height from the foundation with rafters on the sides of the roof.

**HIPPEUS**, or **EQUINUS**, in physiology, a sort of comet resembling a horse; yet, it is sometimes oval, and sometimes rhomboidal. And its train is sometimes emitted from the fore part, and sometimes from the hind-part. Hence it is distinguished into equinus barbatus, quadrangularis, and ellipticus.

**HIPPIATRICE**, the art of curing the diseases of horses, or rather the farrier's art.

**HIPPOCAMPUS**, the sea-horse. This is a little animal kept entire in our druggists shops, though at this time rather as a matter of ornament or curiosity, than of real use. It has been disputed by many, to what class of animals it really belonged; but the height which natural knowledge has of late arrived at, has settled that point. It is a fish, though of a very singular form, as we see it dried, and is of the synganthus, or acus, the needle-fish kind. Artedi describes it under the name of synganthus corpore quadrangulo pinna caudæ carens, the square needle-fish with no tail fin. *Ælian*, *Bellonius*, *Ray*, and the other ichthyologists in general have called it hippocampus; and the Italians at this time call it cavallo marino, and zidrach.

It is about four or five inches in length, and near half an inch in diameter in the broadest part: its colour in the dried state in which we see it is a deep redish brown, and its tail is curled, or turned round under the belly. It is found about the shores of the mediterranean in several places. There are also two other species found in the same places. It has been celebrated for many virtues, but is at present wholly neglected.

**HIPPOCENTAUR**, in antiquity, a fabulous monster supposed to be half horse and half man. A people of Thessaly inhabiting near mount Pelion, who first taught the art of mounting on horseback, gave occasion to some of their neighbours to imagine that the horse and man constituted but one animal.

**HIPPOCRAS**, *Vinum Hippocraticum*, in medicine, an infusion of aromack powders in wine, which is afterwards edulcorated with sugar or honey. It is prepared of various aromacks, and other ingredients, according



according to the different intentions to be answered, &c.

**HIPPOCRATES'S SLEEVE**, *Manica Hippocratis*, a kind of filtre or straining-bag formed by joining the opposite angles of a square piece of flannel in form of a pyramid, and used to strain sirups, decoctions, &c. for clarification.

**HIPPODROME**, *Hippodromus*, in antiquity, a course where horse races were performed.

**HIPPOMANES**, a sort of poison, famous among the ancients as an ingredient in amorous philtres or charms. Naturalists are not agreed about the nature of the Hippomanes.

**HIPPOPODES**, in ancient geography, people situated on the banks of the Scythian sea; so called, on account of their swiftness being almost equal to that of horses feet.

**HIPPUS**, in medicine, a disorder of the eyes, under which they are continually trembling and twinkling, as is usual with those who ride on horseback, to whom objects appear fluctuating. It is owing to an affection of the muscle that sustains the eye, and embraces the base of the visual organ.

**HIRCUS**, in anatomy, a part of the auricle or outer ear, being that eminence next the temples. See **EAR**.

**HIRCUS**, a goat, in astronomy, a star of the first magnitude, the same with **Capella**. See **CAPELLA**.

**HIRUDO**, the leech, in zoology, a well known naked insect, with a flatted but not jointed body, and broader at the end than elsewhere, and the skin soft and glossy.

**HISPID LEAF**, among botanists, one whose surface is covered with more thick and rigid hairs than the pilose leaves are.

**HISPID STALK**, among botanists, a stalk roughly hairy.

**HISSING LETTERS**, among grammarians, are S, X, and Z, so called on account of their harsh sound.

**HISTORICAL**, something relating to history.

**HISTORICAL Colum**, that whose shaft is adorned with basso-relievos, &c. representing the history of some illustrious person. The figures may be disposed spirally from one end to the other, as in the Trajan column at Rome, or in distinct bands containing so many different subjects.

**HISTORIAN**, or **HISTORIOGRAPHER**, a professed historian, or writer of history.

**HISTORY**, an account, properly speaking, of past transactions, narrated with such important circumstances as are proper to be transmitted to posterity, and that in a regular continued series.

History is, of all others, the most difficult province. In other subjects there is a greater latitude for the writer's imagination; but, in history, he is confined to the occurrences he relates; and these, as they are not alike entertaining, require force and judgment in the narration to make them all agreeable. The richest fields of history are scenes of action and commotion, where nations are agitated by wars abroad, or factions at home. The most delicate part of an historian, which requires the deepest penetration, and soundest judgment, are the councils of states and princes, the springs of action, the characters of men, the interest of parties, their different views, &c. History will not admit those decorations other subjects are capable of: the passions are not to be moved with any thing but the truth of the narration. All the force and beauty must lie in the order and expression. To relate every event with perspicuity, in such words as best express the nature of the subject, is the chief commendation of an historian's style. The colours facts are painted in, the strength and significance of the several actions, the regular confusion of a battle, the distractions of a tumult so sensibly depicted, that in reading we seem to see them; this is the art and perfection of an historical style. An historian must not only write impartially, but nobly. He that speaks to the whole world, and to all ages, that is the instructor of mankind, that pronounces the destiny of so many great men, and fixes their character with posterity, what strength of genius can be sufficient for so important an enterprize? He must be capable of

forming great and noble conceptions of things, and giving such an exalted turn to his narration, as may truly comport with the dignity of his subject.

During the first ages, we have little or no history of the transactions of mankind, but that of Moses, whose account is chiefly confined to the rise, religion, laws, and government of the Jews. It is presumed he wrote the principal part of his history about the year of the world 2550, and had good opportunities of knowing the truth of his relations. He gives a regular account of the Jewish affairs, from the creation to the year 2550: from this period the sacred history is carried on by different writers, and continued down in the books of Joshua, Judges, Ruth, Samuel, Kings, Chronicles, Ezra, and Nehemiah, to the year of the world 3581.

As to prophane history, till almost the time where the Scripture records end, we have little remains of it, but what are either broken and confused, or fabulous: for, from the creation to the flood, we have no credible account of things, but that of Moses; and from the flood to the reign of Cyrus, the remains of antiquity are so broken and confused, that we have little prophane history of credit during this long and dark period. As to the Chaldean History of Berosus, and the Egyptian of Manetho, they were both wrote since Herodotus, and we have only some fragments of them preserved by Josephus, Eusebius, &c. As to Sanchoniathon, who has given us the Phœnician history, though he pretends to be much more ancient, yet his great antiquity has been justly questioned by Scaliger, and his very existence by Mr. Dodwell.

The Greeks, as they have not been noted for their veracity in any respect, so their integrity in this particular has been always so questionable, that *Græcia mendax* has been stigmatized in history. We have no tolerable account from them before the Olympiads; the times before these were the fabulous ages; and when the historical commences, our accounts are not much better; for, not having had originally any publick annals, and amongst their ancient authors the poets having the first rank, we may easily imagine what accounts are to be expected from those, who are either to follow uncertain traditions, or the poets. Accordingly their first accounts were very loose, and rather poems than histories, which they have been charged with by the Romans, and particularly Quintilian compares the liberty they took to a poetick license: but Josephus tells them their accounts of things are all novel; that they have no author more ancient than Homer; that Hellanicus differs from Acusilaus; he corrects Hesiod, and Hellanicus Ephorus; he again is corrected by Timæus, as he is by others, and Herodotus by all, who has been styled the father of history, though he might with equal justice be called the parent of fable.

The historians from whom the Grecian and Roman history may be collected, are Thucydides, Diodorus Siculus, Lucian, Justin, Xenophon, Ctesias, Polybius, Dionysius Halicarnassæus, Philo, Apion, Cornelius Nepos, Q. Curtius, Plutarch, Ælian, Arrian, Appian, Diogenes, Laertius, Dio Cassius, Herodian, Eunapius, Zosimus, and Photius.

As to the Roman history, it at first only consisted of simple notes drawn up by the pontifex maximus, who regularly set down every year whatever passed of considerable moment in the state, either in war or peace; and this custom, established very early at Rome, subsisted till the year A. U. C. 629, or 631. These memoirs were called the great annals. History now began to quit this antique garb, and to appear in publick with more decency. The poets were the first who conceived a design of improving and adorning it. Nævius composed a poem on the first Punick war, and Ennius wrote the annals of Rome in heroick verse. History at length assumed a regular form, and appeared in prose. Q. Fabius Victor is the most ancient of the Latin historians; he lived in the time of the second Punick war. The historians whose writings are come down to us are Sallust, Livy, Cæsar, Paternulus, Tacitus, Q. Curtius, Suetonius, Lucius Florus, Justin, Aurelius Victor, Ammianus Marcellinus, and Eutropius. Authors of the lives of the Roman emperors, from Adrian



to Carinus, are Spartianus, Lampridius, Vulcatius, Capitolinus, Pollio, and Vopiscus, who all lived in the reign of Dioclesian. If we have regard to only one condition of history, namely, its truth, we shall find that most of the above authors are faulty in that particular.

Le Moyne only allows four historians among the Romans, and not so many among the Greeks, and all of them short of perfection; and as to the moderns, he is yet more scrupulous in admitting them into account.

There are some works in English very useful for the understanding of ancient history, as Hind's History of Greece, Potter's Greek Antiquities, Lewis's Hebrew Antiquities, Kennet and Danet's Roman Antiquities; Prideaux and Shuckford's Connections, Echard's Roman History, Translation of Josephus, Rollin's Ancient History, Universal History, Bundy's Translation of the Roman History, Nicholson's Historical Library, Kearne's *Duelor Historicus* and Rawlinson's Method of studying History: the two last particularly will give the reader a general view of universal history, and direct to the best editions of almost all the historians extant.

As to the historical accounts of those nations that grew out of the ruins of the Roman Empire, which included the greatest part of the known world, the best histories in this way are Salmon's Modern history, Sir Walter Raleigh's History of the World, Mezeray's and Daniel's History of France, Le Clerc's History of the United provinces, Mariana's History of Spain, Meius's History of Flanders, Heuterus's History of Burgundy, Bonfinius's History of Hungary, Cromerius's History of Poland, Aventinus's History of Bavaria, Le Quien's History of Portugal, Vertot's Revolutions of Portugal and Sweden, &c. The Germans and Italians abound with particular memoirs of their different states and governments, but have no complete body of history. The only historians that have given us a large and comprehensive view of the History of England, are Echard, Rapin, Hume, and Smollett.

Besides these four, we have also the particular histories of several princes's reigns, as Sir Francis Bacon's History of Henry VII. Clarendon's History of the Rebellion, Sir William Temple's Introduction to the History of England. There is also Camden's Britannia, Tyrrel's History of England, Buchanan's and Duff's History of Scotland, Sir James Ware and Cox's History of Ireland, &c.

Thuanus and bishop Burnet, &c. have written the history of their own times.

The great disadvantage our most celebrated historians seem to labour under, is too tedious an interruption by the insertion of laws, statutes, and records in the body of their narration, at least in making too copious a recital of them; whereas they had better have been mentioned only in general, and thrown by themselves into an appendix.

History is distinguished with regard to its matter and its form; with regard to its matter, it is either sacred or natural, civil, personal or singular.

*Method of studying HISTORY.* Persons who read history merely for amusement, or having in view some particular branch of learning, attend only to certain branches of history, are not confined to that order and connection, which is absolutely requisite for obtaining a proper knowledge of history; the most regular, as well as successful way of studying which, is to begin with an epitome of universal history, and afterwards apply to the history of particular nations and commonwealths: for the study of particular histories presupposes, or to speak more properly, is only extending the knowledge of particular parts of universal history. Unless this be our plan, we shall only fill the memory with some events, which may be done without applying to history, or pretending to the knowledge of it.

*Natural HISTORY*, a description of the objects in the animal, vegetable, and mineral kingdoms.

*HISTORY*, in painting, denotes a picture composed of divers figures, or persons, representing some transaction, either real or feigned. See *PAINTING*.

*HISTRIO*, in the ancient drama, signified an actor

or comedian, but more especially a pantomime, who exhibited his part by gestures and dancing.

*HITCH*, in the sea-language, is to catch hold of any thing with a hook or rope, and by this means to hold it fast: thus when a boat is to be hoisted in, the sailors say, Hitch the tackles into the ring-bolts of the boat; and when they are about to weigh anchor, Hitch the fish-hook to the fluke of the anchor.

*HITHE*, or *HYTHE*, in our old writers, denotes a port, wharf, or small haven, to embark, or land wares at; as Queen-hithe, &c.

*HIVE*, *Alveare*, in country affairs, a convenient receptacle for bees. See *APIS*.

*HIVING of Bees*, the placing a swarm of these insects in a hive provided for that purpose.

*HOACHE*, in natural history, a kind of earth approaching to the nature of chalk, but harder, and feeling like soap; whence some think that it is either the same with our soap rock of Cornwall, or very like it. The Chinese dissolve it in water, till the liquor is of the consistence of cream, and then varnish their china ware with it.

*HOARSENESS*, *Raucedo*, a preternatural roughness of the voice. The part affected is the aspera arteria, particularly the larynx. This is a sort of catarrhus indisposition arising from a too great acrimony, thinness, or saltiness of the lymph. *Spermaceti*, decoct. rapar. and rob. passular. are approved remedies in this disorder.

*HOASE*, among sailors, a piece of canvas sewed together at the sides, and made into the form of a tube, to convey water from one place to another; this is more particularly used in the hold or lower apartments of the ship, to fill the casks which are already securely stowed.

*HOD*, a well known instrument used by labourers to carry bricks, mortar, &c. in, at the building, or repairing of houses, &c.

*HOE*, in country affairs, a tool made like a cooper's adz, to cut up weeds in gardens, fields, &c. This instrument is of great use and should be more employed in hacking and clearing the several corners, cracks, and patches of land, in spare times of the year, which would be of no small advantage thereto.

*HOEING*, in agriculture, according to Tull, is the breaking or dividing the soil by tillage, while the corn, or other plants are growing thereon. It differs from common tillage, which is always performed before the corn or plants are sown or planted, or in the time of performing it: and it is much more beneficial to the crops than any other tillage. This sort of tillage is performed various ways, and by means of different instruments. Land which before the tillage, would have yielded little, though the more it is tilled before sowing, the more plenty of corn it yields, yet, if tilled only before the sowing, will always have some weeds, and they will partake of the advantage of the tillage as well as the corn.

*HOG*, *Sus*, in zoology, a genus of quadrupeds, of the order of the jumenta, the characters of which are these: the upper fore-teeth are four in number, and are convergent; those of the lower jaw are eight, and are patulous: the canine teeth of the upper jaw are two, and very short; those of the under jaw are single, and exerted: the crown of the head is carinated, and the hoof is divided. Besides the common hog there are several other species, as, 1. The American hog, with the back bristly behind, and with a naked tail. 2. The musk-hog, with a cyst, or gland on the back, in which is secreted a perfumed fluid; its tail is naked; 3. The babyroussa, with two teeth growing on the forehead.

*HOGSHEAD*, in commerce, a measure of capacity, containing 63 gallons.

*HOISING*, in the sea-language, the act of drawing up any weighty body by the help of a tackle or complication of pulleys.

*HOKE-DAY*, the Tuesday after Easter-week, which was the day on which the English conquered and expelled the Danes: this was, therefore, kept as a day of rejoicing, and a duty, called Hoke-Tuesday-Money,



was paid to the landlord, for giving his tenants and bondmen leave to celebrate it.

**HOLCUS**, Indian millet, in botany, a genus of plants, whose flowers are male and hermaphrodite on the same plant: the corolla of the hermaphrodite flower is a bivalvular glume, with three capillary stamina and two styles, and contains an oval seed involved in the corolla; the male flower is destitute of a corolla, the cup being a glume, containing three hairy filaments topped with oblong antheræ.

**HOLD**, in ship-building, all that part of a ship's inside which reaches from end to end, from the lower deck to the floor or bottom; and contains the cargo, provisions, &c.

**HOLDFAST**, a large piece of iron, in the shape of the letter S, fixed in a wall to strengthen it: also a tool used by joiners, carvers, &c. which goes through their benches, to hold fast such work as cannot be finished by its being held in the hand.

**HOLIBUT**, the name of a very large flat fish, resembling the flounder, but longer in proportion to its breadth.

**HOLLAND**, in commerce, a fine and close kind of linen, so called from its being first manufactured in Holland. See **LINEN**.

**HOLLOW**, in architecture, a concave moulding about a quarter of a circle, called by some a casement, and by others an abacus.

**HOLLOW-SQUARE**, in the military art, a body of foot drawn up, with an empty space in the middle for colours, drums, and baggage.

**HOLLOW-TOWER**, according to Hanis, is a rounding made of the remainder of two brisures, to join the curtain to the orillon, where the small shot are played, that they may not be so much exposed to the view of the enemy.

**HOLLY**, *Ilex*, in botany, a well known ever-green, formerly very much planted in gardens as an ornament; it grows naturally in woods and forests in many parts of England, rising to 20 or 30 feet in height; the stem by age becomes large, and is covered with a greyish bark; the leaves, which are armed with thorns, are placed alternately on every side of the branches: the flowers are of a dirty white, and appear in May; these are succeeded by roundish berries, which turn red in autumn, and continue on the trees till after Christmas.

The tree is raised by sowing the berries in the spring, but they will not come up till the year following. There are several varieties of variegated hollies, which are increased by grafting or inculcating them on the common sort. The holly makes an excellent fence, and for that purpose is preferable to most other plants; but its being a slow grower at first, deters several from using it; but when it does take to growing it makes amends by its height, strength, and thickness. From the bark of the common holly is made the bird-lime, and the wood is made into hones for setting razors; it is the whitest of all hard woods, and therefore used by inlayers; it is also used by mill-wrights, turners, &c.

**HOLOCAUST**, a burnt-offering, or sacrifice, wholly consumed by fire; of this kind was the daily sacrifice in the Jewish church. This was done by way of acknowledgment, that the person offering, and all that belonged to him, were the effects of the Divine bounty.

**HOLOGRAPH**, in the civil law, an instrument entirely in the hand-writing of the person who signs it.

**HOLOMETER**, a mathematical instrument for taking all sorts of measures, both on the earth and in the heavens; it is the same with the pantometer.

**HOLY-GHOST**, one of the persons of the holy Trinity. See **TRINITY**.

*Order of the HOLY-GHOST*, the principal military order in France instituted by Henry III. in 1569. It consists of 100 knights, who are to make proof of their nobility for three descents. The king is the grand master, or sovereign, and as such takes an oath on his coronation day, to maintain the dignity of the order.

**HOLY-THURSDAY**, the same with ascension-day. See **ASCENSION**.

VOL. I. No. 38.

**HOLY-DAYS**, the same with festivals. See the article **FESTIVAL**.

**HOLY-ROOD-DAY**, a festival, otherwise called the exaltation of the cross.

**HOMAGE**, in law, is the submission, loyalty, and service which a tenant promised to his lord, when he was first admitted to the land which he held of the lord in fee: also that owing to a king, or to any superior.

**HOMAGE-JURY**, a jury in a court baron, consisting of tenants that do homage to the lord of the fee. This jury makes enquiry into, and presentments of, defaults and deaths of tenants, and of admittances and surrenders into the lord's court.

**HOMESOKEN**. See **HAMSOKEN**.

**HOMICIDE**, in common law, the killing a man.

It is divided into voluntary and casual. Casual is either merely casual, or mixed; the former is when a person kills another by pure mischance, being about his lawful occasions; it is accounted mixed, when there is negligence or some unwarrantable circumstance attending the action. Voluntary homicide, that which is deliberate; and is either with a precedent malice, or without: the former is a felonious killing, with malice prepense, any person in the realm, who is under his majesty's protection.

**HOMILY**, in ecclesiastical writers, a sermon, or discourse, upon some point of religion, delivered in a plain manner, so as to be easily understood by the common people. It is much to be wished that our incomparable homilies were more universally read, and better understood.

**HOMODROMUS, VECTIS**, that kind of lever, in which the weight is in the middle, between the power and the fulcrum, or the power in the middle between the weight and the fulcrum. See **LEVER**.

**HOMOGENEOUS**, or **HOMOGENEAL**, denotes such subjects as consist of parts of the same nature, in contradiction to heterogenous, where the parts are of different natures.

**HOMOGENEAL LIGHT**, that whose rays are all of the same colour, degree of refrangibility, and reflexivity. See **COLOUR**.

**HOMOGENEAL NUMBERS**, such as are of the same kind.

**HOMOGENEAL SURDS**, such as have one common radical sign, as  $\sqrt[2]{a}$   $\sqrt[2]{b}$ , or  $\sqrt[3]{b^3}$ . See **SURD**.

**HOMOGENEUM COMPARATIONIS**, in algebra, the known quantity in an equation, the same with absolute number. It is so called to distinguish it from the other terms, which, though homogeneous, are not the quantities to which things are here referred.

**HOMOLOGOUS**, in geometry, is applied to the correspondent sides and angles of similar and equiangular figures, which are said to be homologous, or in proportion to one another.

**HOMOLOGOUS THINGS**, in logick, those which agree in name, but are of different natures.

**HOMONYMOUS**, an appellation given to words which have two different significations, being the same with equivocal terms.

**HONE**, a fine kind of whetstone, used for setting razors, pen-knives, and the like.

**HONEY**, *Mel*, is, in general, a thick, viscous, and more or less fluid substance, of a whitish or yellowish colour, sweet to the taste, soluble in water, becoming vinous in fermentation, inflammable, liquable by a gentle heat, and of a fragrant smell.

There are three distinctions of honey, according to its purity, fluidity, and the manner in which it has been procured from the honey-combs. The first and finest kind is virgin-honey, or the first produce of a swarm, obtained from the combs without pressing; these being only set to drain, in order to its running out. The second kind is that known by the name of white honey, being thicker than the former, and often indeed almost solid: it is procured by pressing the combs, but without the assistance of heat. The third and worst kind is the common yellow honey, obtained from the combs first heated over the fire, and then pressed.

Honey is prepared in the nectaria, or honey-glands of plants, situated in their flowers; the only office of the



the bees is to collect the small quantities lodged there, and to amass them in stores capable of furnishing themselves with food, and us with a supply sufficient for our purposes. The bee that is out in search of honey, no sooner sees a flower that it likes, than it settles on it, and seizing on these glands, it sucks from them all the sweet juice they contain, which is either absolute honey, or very easily changed into such. The honey thus taken into the body of the bee, and deposited again into the cells of the honey-comb, is destined not only for the food of the young offspring, while unable to go out and help themselves, but for the sustenance of the bees themselves in bad weather, or when there is no food for them abroad. Notwithstanding, however, that honey is known to be originally lodged in the flowers of plants, and might seem to be always ready in sufficient quantities for the bee; yet it is necessary that several circumstances concur, in order to its being fine and perfect in its kind. Among these are, a warm and serene state of the air, during the time in which the bees are most of all employed in making it, and a good state of health in the bee, as also its being made at a time when many fragrant plants are in flower, and in a place where such grow not too far off.

Honey taken out of the new combs early in the summer, is vastly preferable to that taken from the same hive in autumn. The reason of this is, that the bees, during the time of their making the former, have been in a more healthy and vigorous state, and that there have been fragrant flowers in greater number and perfection at that season, than later in summer.

Honey is an excellent pectoral, and is detergent, aperient, and diuretick. It should always be clarified by melting it over the fire, either alone, or with the whites of eggs, taking off the scum, before it is used in medicine. The chymists pretend to have made an acid spirit from it, which is a solvent for gold; but we have only their assurance of it, nobody else having ever seen such a liquor.

**HONEY-Comb**, a waxen structure full of cells, framed by the bees to deposit their honey, eggs, &c.

There is something very wonderful in the construction of the cells in the honey-comb: each cell consists of six plane sides, which are all trapeziums, but equal to each other. The bottom of the cell is contrived with three rhombuses *H K D I*, *D E F I*, and *F I G H* (*plate XL. fig. 4.*) so disposed as to constitute a solid angle at *I*, under the three equal angles *D I H*, *D I F*, and *H I F*; each of which is double the maximum angle of  $54^{\circ} 44' = D I K = D K I$ . Hence it comes to pass, that a less quantity of surface is sufficient to contain a given quantity of honey, than if the bottom had been flat, in the proportion of 4658 to 5550, as has been found by calculation; that is, nearly  $\frac{1}{3}$  of the whole, so far as the figure of the ends of the cells extend in each, which fifth part of wax and labour saved, amounts to a vast deal in the whole comb. And, if those admirable insects knew their advantage, they could not more nicely observe the rules of the modern geometry. Hence we may observe, that though the method of discovering the maxima and minima of quantities by fluxions is a part of knowledge which the mathematicians have but lately acquired, and which they esteem the sublimity of human science; yet this very thing was imparted to these insects at the first creation of things.

**HONEY-Comb**, in gunnery, a flaw in the metal of a piece of ordnance, when it is ill cast and spongeous.

**HONEY-Dew**, or *Mildew*, a sweet-tasted dew, found early in the morning on the leaves of divers plants. It is very different from blasting, and is caused by the condensing of a fat moist exhalation raised in a hot dry summer from plants and blossoms; as also from the earth, which, by the coolness and serenity of the night air, is thickened into a fat gluey matter, and falls to the earth again, part whereof rests on the leaves of the oak, &c. According to Gassendus, a viscid juice, transpiring out of the leaves, helps to compose this honey substance which before had nothing of it. And hence the reason, why it is found on some trees and not on others. This honey-dew falling on wheat, so binds up its ears, as to prevent the growth of the grain. A shower of rain

succeeding presently after, or a stiff gale of wind, are the only natural remedies against it.

**HONI SOIT QUI MAL Y PENSE**, evil to him that evil thinks, the motto of the order of the garter.

**HONOUR**, *Honor*; besides it being a testimony of submission and esteem, it is particularly applied, in our customs, to the more noble kind of lordships, whereof other inferior ones hold.

*Counsellors of Honour*, or *HONORARY Counsellors*, such as have a right to sit in assemblies, courts, &c. to deliberate and give judgment therein, though they do not properly belong thereto.

*Ladies of Honour*, young ladies in the queen's, &c. household, whose office is to attend the queen. They are six in number, with a salary of 300l. per ann. each.

**HONOURS**, the principal parts of the apparatus of great ceremonies, as coronations, &c.

*Funeral Honours*, the ceremonies performed at the interments of great men, as hearses, funeral orations, &c.

**HONOUR Point**, in heraldry, that next above the centre of two escutcheons, dividing the upper part into two equal portions.

**HONOURABLE Ordinaries**, in heraldry, the principal bearings, which, when in their full extent, may possess one-third of the field. Some only allow of nine, as the cross, chief, pale, bend, fesse chevron, saltier, giron, and escutcheon; others add the bar, bordure, &c.

**HOOF**, *Ungula*, the horny part that covers the feet of divers animals; it serves much the same purposes as the nails of some animals, and the claws of others.

The hoof of a horse surrounds the sole and the coffin-bone. To be good, it should be of a dark colour, somewhat shining, high, smooth, round, but somewhat larger below than above; short, that the horse may tread more on the toe than on the heel; somewhat hollow within, having a narrow frush, and short heels. A white hoof is commonly brittle. The infirmities to which hoofs are liable, are the casting of the hoof, hoof-bound, loose hoof, false quarters, &c.

*Casting of the Hoof*, is when the whole coffin of the hoof becomes loosened and falls off from the bone. This arises from some prick, stub, foundering, furbating, &c. that causes an imposthumation in the foot, whereby the hoof, and sometimes the coffin-bone, being spongy, falls off in large pieces. This last is a desperate case.

**HOOF-bound**, a shrinking in of the hoof at top, and at the heel, which makes the skin grow over it. It is caused by keeping a horse too dry in the stable, straight shoeing, or some unnatural heat after foundering.

**HOOF-loosened**, a dividing of the horn of a horse's hoof from the flesh, at the setting on of the coronet. If the parting be round about the coronet, it comes by foundering; if in part, then by a prick, quitter-bone, retreat, gravelling, cloying, &c.

**HOP**, *Lupulus*, in natural history, a plant of the reptile kind, whose flower is a principal ingredient in beer and other malt-liquors. A rich, deep, mellow, dry soil, rather inclining to sand than clay, is, in general, best adapted to the cultivation of hops; but a black garden mould is excellent for this purpose. Stiff clays, spewy lands, such as are apt to be overflowed by floods, hard gravels, stony grounds, very sandy ones, and such as are not at least a foot and a half deep, are altogether improper for hops.

The best situation for hop-grounds is such as inclines to the south, or lies open to it, so that they may have the benefit of the sun during the greatest part of the day. It must also be open, for the air to have a free passage and circulation between the plants, and it should be so sheltered to the east, north, and west, that neither the frosty winds in the spring may cut off the young sprouts, nor the more stormy ones in summer and autumn destroy the full-grown hops. The ground and situation being chosen, the next business is to prepare it for the planting. In many parts of England, when the ground is broken up for this purpose, the plough goes first, and men follow it with the spades, with which they dig one spit deep in the furrows where the plough has passed, throw up the earth thus dug, and so continue to plough and dig till the whole is done. Either this tillage, if it be well performed, or  
the



the deep ploughings, cross-ploughings and harrowings, by which careful husbandmen prepare their land for corn, will fit this for being sown with turnip-seeds in the end July, or beginning of August; and if the turnips are hoed twice, so as to be left about eight inches asunder, they will yield a good crop, the weeds will be destroyed, and the ground will be rendered loose and fine. Another good ploughing after the turnips are taken off, will, with the ensuing winter mellowing, render it fit for being planted with hops in the spring.

The best time to begin ploughing is in October, in order that the soil may be properly prepared to receive the benefits of the winter's frosts, rains, and snows; after which, in the beginning of spring, it should be well and deeply ploughed again, and well harrowed; and after another ploughing in March, which will be of very great service, it should be harrowed fine, and laid as as even as can be. When the ground is in proper readiness for planting, stretch along a straight side of the field, at fifteen or twenty feet distance from the hedge, and parallel to it, a line with knots or rags tied in it, as far asunder as you design your hills to be, and stick in the ground a sharp-pointed stick at every knot, as marks for the places where the hills are to be made; continue the line in this manner the whole length of the ground, and from this first row you may mark out the rest of the field, either in squares, chequer-wise, at the intended distance of the hills, or in the quincunx form, where the hills of every row lie opposite to the middle of the first, in a triangular form. The distance of the hills should be, in some measure, regulated by the nature and goodness of the soil: but, in every case, they should be far enough asunder to admit the hoe-plough at all times without danger to the plants. If the soil be dry and shallow, six or seven feet will be a convenient distance: but if it be rich, moist, and apt to bear large hops and leaves, it may be right to allow eight or nine feet between the hills.

The most proper season for planting hops, is from the beginning of March to near the middle of April, at the time when they begin to shoot. The Kentish husbandmen approve likewise of October: but the common sorts are not to be procured then, unless it be from a ground that is to be dug up and destroyed; besides which, there is some danger of their rotting in the earth, if the winter should prove very wet.

There are several sorts, though the botanists allow but one species of hops. The most esteemed are, the long white, the oval, and the long square garlick hop. These differ from each other in the colour and shape of their bells or hops, in their degree of bearing, and in their time of ripening. The long white is most valued, because it is a great bearer, and produces the most beautiful hops; for the beauty of hops consists in their being of a pale bright green colour. The oval hop is beautiful, but does not yield so large a crop. There is a sort of this kind of white hop, called the early or rath hop, which ripens a week or ten days before the common, and is therefore of advantage to those who would be first at market: but it is tenderer than the other, and does not bear near so plentifully. The long square garlick hop is the greatest bearer, more hardy, and somewhat later ripe than the former: but by reason of its redness towards the stalk, it is not so beautiful to the eye, and therefore is not so much esteemed as the other sorts.

Few hop-grounds are without some plants of a sort of hop which many call the female hop, but very erroneously; for the female hop is that which is cultivated for use, and this, which others name more properly the wild hop, is the male. Towards the middle of July, it puts out a great number of long loose bunches of small flowers, not at all like the true hop; and in somewhat less than a month after, that is to say, just before the true hop begins to blossom, they ripen, and with the least motion of the wind, shed a farina, which is wafted all round, and is by some, not improbably, thought to be of use to impregnate other hops. Those who are of this opinion advise, therefore, to leave one or two hills of them standing in the hop-ground. But the common practice is to mark them at their first appearance, and to root them out afterwards, because they do not bear

bells or hops, and as they are generally the strongest plants, sets might otherwise be taken from them by mistake. There is also a poor starved hop, called a wild hop, which is not judged to be a distinct sort, but a hop which has degenerated for want of culture.

The planter of hops ought to be extremely careful in the choice of his plants, or sets, particularly in regard to the kind of the hop: for it is a great trouble and loss to him, when his garden proves to be a mixture of several sorts of hops, ripening at different times. He who plants the three sorts above mentioned, viz. the early, the long white, and the square hop, in three distinct parts of his ground, will have the convenience of picking them successively as they become ripe. Hop-sets are cuttings from the roots or branches which grow from the main root or stock. They should be procured, if possible, from grounds planted with none but the sort which is desired; and they should be from five to seven or eight inches long, with three or more joints or buds on them, all the old bind and hollow part of the set being cut off.

The ground being prepared for planting, as before directed, towards the latter end of February, or in the beginning of March, if the soil be light, or late in March, if it be strong and moist, make, in the places marked out by the sticks stuck in them, holes about twelve or sixteen inches wide, and of a depth proportioned to the nature of the ground. In general, ten or twelve inches will be a sufficient depth. If the ground be shallow, and you meet with hard clay or gravel, by no means enter into this, for you would then make a basin to retain water; but, in such case, instead of going deeper, raise up a small hill of good mould. If there is a good depth of rich mellow mould, dig the hole a foot and a half, or two feet deep, and you will find the hops thrive the better; for their tap roots naturally run downward.

When all things are ready for planting, fill up the holes with the mould before thrown out of them, if it be naturally good, after having first broke it fine with a spade: but if the same earth be not rich enough, make use of fine fresh mould, or of the compost provided for this purpose. About a peck or two of this will be sufficient for each hill; but no new dung should be put into the hole on any account. Then, with a dibble or setting-stick, such as gardeners generally use for planting of beans, make five or six holes, the depth of your sets, one in the middle, perpendicular, and the rest round about, sloping and meeting at the top near the centre: put your sets therein, so that they may stand even with the surface of the ground; and then press the mould close to them, and cover them with fine mould two or three inches thick. A stick should be placed on each side of the hill to secure it.

The ground being thus planted, all that is to be done in the following summer, is to keep the hills and alleys clear from weeds by frequent hoeings; to dig the ground in the month of May, and to carry off all the stones that are turned up by digging; to raise a small hill about the plants; to throw some fine mould on their roots; and, in the latter end of May, or beginning of June, to twist all the vines and branches together into a bunch or loose knot, and lay them thus twisted on the top of the hill.

Towards the latter end of February, or in the beginning of March, in the second year, when the weather is kindly, open the hills, and with a sharp knife, cut off the shoots, of the first year, to within an inch of the old stock, together with all the younger suckers that have sprung from the sets, and cover the stock with fine earth. To keep the knife sharp, you should have a whetstone always by you at dressing.

In the third and following years, when you dig your hop-ground in February, let the earth be taken away with a spade or hoe, round about the hill, very near them, that you may the more conveniently come at the stock to cut it; then in fair weather, towards the beginning of March, if your hops be weak, begin to dress them; but if they are strong, and in heart, the middle or latter end of March will be the best time; for late dressing restrains their too early springing, which is the cause of many injuries to the hop.

After the hops are dressed in the second year, the next business is to pole them. Poles of only ten or twelve feet



feet long will do then ; but in the third year, by which time they come to their full bearing state, they will require poles of full size : this, if the ground be rich, and the hop vigorous, will be from sixteen to twenty feet, or even more ; or there will be danger of losing great part of the crop. If the hop be weak, and the ground not rich, the poles should not be more than from fourteen to eighteen feet long, for fear of impoverishing the root ; for the hop will soon run itself out of heart if over-poled ; so that, as was said before, there is more danger in over-poling than in under-poling ; neither can a good crop be expected from an over-poled ground, because the branches which bear the hops grow very little till the buds have over-reached the poles, which they cannot do when the pole is too long. Two small poles are sufficient for a hill in a young ground.

Towards the latter end of July hops begin to blossom, about the beginning of August they bell, and in forward years, they are sometimes ripe at the end of August, or beginning of September. When they begin to change colour, or are easily pulled to pieces, when they emit a fragrant smell, and when their seeds begin to look brown and to grow hard, you may conclude that they are ripe : then pick them with all expedition ; for a storm of wind will do them great mischief at this time ; and hops picked green and bright, without bruising or discolouring, will sell for a third part more than those that are otherwise.

When the poles are drawn up in order to be picked, the vines around them should be cut asunder, at the height of about three or four feet from the ground ; for the cutting of them lower, especially while the hops are green, would occasion so great a flowing of the sap, as would weaken and hurt the root.

The most convenient way of picking them is into a long square frame of wood, called a bin. This frame is made of two poles, or pieces of wood, each nine or ten feet long, and three or four inches broad, joined together at about a foot and a half from each end, by two other pieces three feet long ; and it is supported by four legs three feet and a half high ; so that there remain in the middle of it a space six feet long, three wide, and three and a half deep. In this space is fixed a coarse linen cloth, or hop-bag, cut open on one side and hung hollow, either by hitching it on tenter-hooks along the inside of the frame, or by stretching it on the outside with wooden skewers, to receive the hops as they are picked. Three men or women, or four boys or girls, may stand at each side of the frame, and pick two poles at a time.

The hops should be picked as free as possible from leaves and stalks ; for these would be of greater prejudice to the sale than any seeming advantage which might be expected from their weight. The bin should be emptied two or three times a day into a large cloth of coarse linen, in which the hops should be immediately stitched up with skewers, and carried directly to the oast or kiln to be dried : for if they remain long in the bin or cloth, they will sweat and be discoloured.

If any brown hops are met with in the picking, care should be taken to separate them from the rest, by putting them into a basket by themselves.

If the weather be very hot or rainy, cut no more hops than may be picked in an hour : but, if it be possible, gather them in fair weather only, and when they are dry ; for this precaution will save some expence of coals, and contribute to the better preservation of their colour when they are dried. No hops should be gathered when the dew is on them, for that would make them become mouldy.

When you have taken the poles from the hills, twist together the remaining ends of the binds, that they may not get among people's legs, and hinder their work.

Before you draw the poles, observe whether the hops of one pole be entangled above with those of another ; and if they are, cut them asunder with a sharp hook fixed at the end of a long pole.

If the garden be large, it may be worth while to raise a shed in the midst of it, to shelter the pickers and the hops from the sun and rain ; and to lay hops in overnight, to be picked early the next morning before the

dew is off the other hops. This shed will also serve for preserving your poles in winter.

If there be either rain or dew upon the hops at the time when they must be gathered, shake the pole and they will dry the sooner. If they are over-ripe when gathered, they will shed their seeds in which the chief strength of the hop consists ; nor will they then look so green, but somewhat brown, which is a great diminution of their value. It therefore is better to pull the hops, a little before they are ripe, than to wait till they are full ripe. Four pounds of undried hops, thorough ripe, will make one pound of dry ; and five pounds of hops scarcely ripe, though in their full prime, will make no more when they are dried.

There are two principal sorts of hops, viz. the green and the brown. The former yields by much the best colour when dried, and the other is the most plentiful bearer. Brown hops are fit for brown ale ; but the hops for fine pale beer must be green ; for which reason these last are most esteemed.

As fast as you pick hops, dry them on a kiln ; otherwise they will change colour : but if you cannot dry them immediately, and must keep them a little while, spread them on a floor, and by that means the damage which they will receive in a day or two will not be great.

They who have five or six acres of hops may employ ten frames at a time in picking.

The last operation belonging to the cultivator of hops is that of bagging them, which is performed in the following manner : make a round or a square hole, but a round one is most convenient, about twenty-six or thirty inches over, in the floor of the chamber where the hops are laid in heaps after they are sweated. This hole should be large enough to receive the bag, and for a man to go up and down it with ease. Tie with a piece of packthread, an handful of hops in each lower corner of the bag, to serve as handles for the more easy lifting or removing of the bag ; and, with packthread, fasten the mouth of the bag to a frame, or hoop, somewhat larger than the mouth of the hole, that the hoop may rest on its edges, and strong enough to bear the weight of the hops when the bag is full, and of the man who treads them. The upper part of the bag being thus fixed by the hoop, let the rest of it hang down through the hole ; but not so near to the lower floor as to touch the ground : then throw into it a bushel or two of hops, and let a man go into the bag, and with shoes that have no heels, tread the hops down on every side, as hard as he can, till they lie close. Let more hops be then cast into the bag, and be trodden down as before ; and continue this till the bag is full. When that is done, untie it from the hoop, let it down, and sew up its mouth as close as you can, observing at the same time to tie up some hops in the upper corners, as was done before in the lower. The harder the hops are pressed, and the closer and thicker the bag is, the longer and better the hops will keep.

When they are thus bagged, lay them upon a boarded floor, and in a dry place ; for dampness would injure them greatly. At the same time all proper measures must be taken to guard against rats and mice, which, though they do not eat hops, are very apt to spoil them, by making nests and lodging in them.

Some, in treading the hops, use a fifty pound weight, fastened to a rope, and placed in the middle of the bag. The man in the bag treads about it with his feet, and lifts it up now and then, to press them the closer together.

**HOPLITES**, *Hoplites*, in antiquity, such candidates at the Olympick and other games as ran races in armour.

**HORARY** *Circles* of the globe. See **GLOBE**.

**HORARY** *Circles*, or *Lines*, in dialling, the lines or circles that mark the hours on sun-dials.

**HORARY** *Motion of the Earth*, the arch the earth describes in the space of an hour, which is nearly fifteen degrees ; for the earth moves with different velocities, according to its greater or less distance from the sun.

**HORD**, *Horda*, in geography, denotes a tribe of wandering people that strol about, living in tents, ready to shift, when provisions, &c. fail.

**HORDEATUM**, a liquid medicine, made of barley boiled



boiled till it burst, to which are sometimes added the cold seeds, almonds, &c.

**HORDEOLUM**, *Crithe*, or *Barley-Corn*, so called from its resemblance to that grain, in medicine, a tumour that grows in different parts of the eye-lids; it is commonly called a sty. When it is small, it comes only on the edge of the eye-lids, or very near it between the cilia; but, when it is larger, it spreads towards the middle of the lid. In the beginning, an inflammation commonly accompanies these tumours: when they do not suppurate, their matter is concreted, and they become wens, which are sometimes soft, and sometimes very hard. Sometimes this disease disappears awhile, and afterwards returns in a few days.

The cure of this disease is suited to the different circumstances that attend it. If there be an inflammation, the pap of a roasted apple applied by way of poultice soon disperses it, and sometimes only abates the tumour. If it hardens, it must be opened with a lancet, and the hard flesh consumed by a liquid caustick, and afterwards the plaster of the abbot de Grace applied. If the hordeolum comes on the lower eye-lid, it is generally more on the inside than the outside, and is cured by the lapis infernalis, or rather by making an incision therein, drawing out the tumour and applying a collyrium of ten parts of water to one part of spirit of wine. There are other little tumours on the edges of the eye-lids, which by reason of their whiteness and hardness are called chalazæ; as also, another sort called lithiasis or gravel-stone. All which are cured in the same manner.

**HORE-HOUND**, in botany. See **MARRUBIUM**.

**HORIZON**, in astronomy, a great circle of the sphere, dividing the world into two hemispheres, the one upper and visible, the other lower and invisible.

The word is Greek, *οριζων*, and derived from *οριζω*, to bound, terminate, or limit.

The horizon is either rational or sensible.

*Rational, True, or Astronomical* **HORIZON**, called generally the horizon, is a great circle, whose plane passes through the centre of the earth, having the zenith and nadir for the poles thereof. It divides the sphere into two equal parts, or hemispheres. The meridian and vertical circles all cut the rational horizon at right angles, and into two equal parts.

*Sensible, Visible, or Apparent* **HORIZON**, is a lesser circle of the sphere: this circle divides the visible part of the sphere from the invisible, and has for its poles the zenith and nadir; consequently the sensible horizon is parallel to the rational; and it is cut at right angles, and into two equal parts, by the verticals.

**HORIZON**, in geography, is a circle passing over the earth, and dividing the visible part of the earth and heavens from that which is invisible. The altitude or elevation of any point of the sphere, is an arch of a vertical circle, intercepted between it and the sensible horizon.

This is peculiarly denominated the sensible horizon, to distinguish it from the rational, or true, which passes through the centre of the earth, as already observed. The earth is so small in comparison of the immense largeness of the sphere of the heaven, that the planes of the sensible and rational horizon may be taken as coincident; that is, the distance of them when measured in the sphere of the heaven, is insensible, or however not great enough to be discovered by any observation. Let *A B C D* (*plate XL. fig. 5.*) represent the earth; *z h n o*, the sphere of the starry heaven: if an inhabitant of the earth stands upon the point *A*, his sensible horizon is *s e*, his rational horizon *h o*; the distance between the planes of these two is the semi-diameter *A F* of the earth, and is measured in a great circle upon the sphere of the heaven, by the angle *e F o*, or by the arch *e o*; this arch, in so small a circle as *z h n o*, would amount to several degrees, and consequently the difference between the sensible and rational horizon would be great enough to be easily discovered by observation; but this circle in the figure is abundantly too small to represent the sphere of the heaven, proportional to such an earth as is here supposed to be of the magnitude *A B C D*: let us therefore represent the sphere of the heaven by a larger circle *Z H N O*; here the same semi-diameter

of the earth *A F*, measured in this larger circle, amounts to fewer degrees; for the arch *E O* contains fewer degrees than the arch *e o*, and the angle *E F O* is less than the angle *e F o*; but this angle also might amount to several degrees and minutes, and be large enough to be measured by astronomical observation. From what has been said, it follows, that the larger the sphere of the heaven is, in proportion to the globe of the earth, the less sensible is the difference between the sensible and rational horizon, as being measured by a smaller angle; and consequently, if we suppose the sphere of the heaven so large that the angle which measured the distance between the sensible and rational horizon is not above a single second, the difference would be too small to be measured by any astronomical instrument, and consequently insensible: and thus, in fact, in the case at present, the earth, when compared with the sphere of the fixed stars, becomes a point of no sensible magnitude.

The visible horizon is most accurately observed upon the sea, and is therefore, sometimes, called the horizon of the sea. It may be observed by looking through the sights of a quadrant at the most distant part of the sea within view. In making this observation, the visual rays *A D* and *A E* (*fig. 6.*) will, by reason of the spherical surface of the sea, always point a little below the true sensible horizon *S S*, and consequently below the rational horizon *H O*, which is parallel to it, and coincident with it: how much the depression of the horizon of the sea is below the true horizon, is seen by the quadrant. It is obvious, that the higher the eye is, the greater is the depression of the horizon of the sea; this depression is variable; so as to be sometimes a little greater than at other times, though the height of the eye be the same in the several observations: this difference is but small, amounting only to a few seconds, and is owing to the difference in the air, which at different times refracts the visual rays more or less, according as it is of a greater or less density. The visual ray, without refraction, is *A E*, and *E* is the most distant point which could be seen; but, by refraction, the ray *F G* coming from the point *G*, may be bent at *F*, so as to go on from thence in the right line *F A*, and then the view is extended as far as *G*, and the depression of the horizon of the sea is in the line *A F*, which points higher than *A E*, but extends the view further.

A bare inspection of the figure is sufficient to shew that, if the refraction were greater, the view would be extended still further, as far as *M*, though the depression of the horizon of the sea would be less, as is shewn by the line *A L M*.

*F. Lavel*, professor of hydrography at *Marseilles*, found that the arch of the circumference of the earth intercepted between the observatory to the seaward and the horizon, fluctuated between 15 minutes and 13 minutes and a half: whence *M. Cassini* deduces that the extent of the horizon is seven French leagues, of three miles each; and that the observatory is 175 feet high.

**HORIZONTAL**, something relating to the horizon; or that is taken in, or on a level with the horizon: thus we say, an horizontal plane, &c.

**HORIZONTAL DIAL**, that drawn on a plane parallel to the horizon, having its style elevated according to the altitude of the pole, in the place it is designed for. See **DIAL**.

**HORIZONTAL LINE**, in perspective, a right line drawn through the principal point parallel to the horizon; or it is the intersection of the horizontal and perspective planes. See **PERSPECTIVE**.

**HORIZONTAL PARALLAX**. See **PARALLAX**.

**HORIZONTAL PLANE**, that which is parallel to the horizon of the place, or nothing inclined thereto. The business of levelling is to find whether two points be in the horizontal plane, or how much the deviation is.

**HORIZONTAL PLANE**, in perspective, a plane parallel to the horizon passing through the eye, and cutting the perspective plane at right angles.

**HORIZONTAL Range**, or *Level Range*, of a piece of ordnance,



ordnance, is the line it describes, when directed parallel to the horizon.

Dr. Halley has given us the two following useful theorems. 1. A shot being made on an inclined plane, having the horizontal distance of the object it strikes, with the elevation of the piece, and the angle at the gun between the object and the perpendicular, to find the greatest horizontal range of that piece loaded with the same charge of powder, that is, half the latus rectum of all the parabolas made with the same impetus.—Take half the angle contained between the object and the nadir, and the difference of the given angle of elevation from that half; subtract the versed sine of that difference from the versed sine of the angle made by the object and zenith: the difference of those versed sines will be to the sine of the angle last mentioned, as the horizontal distance of the object struck to the greatest range at 45 degrees.

2. Having the greatest horizontal range of a gun, the horizontal distance and angle of inclination of an object to the perpendicular, to find the two elevations necessary to strike that object.—Take half the angle contained between the object and nadir, this half is equal to half the sum of the two angles of elevation sought; then say, as the horizontal range is to the horizontal distance of the object, so is the sine of the angle of inclination to a fourth proportional; which fourth, being subtracted from the versed sine of the angle formed by the object and zenith, leaves the versed sine of half the difference of the angles of elevation, whose half sum was before obtained; therefore, by adding and subtracting half the difference of the angles of elevation to and from the said half sum, the elevations themselves will be found. See PROJECTILES.

HORIZONTAL REFRACTION. See REFRACTION.

HORIZONTAL SHELTERS, among gardeners, are defences disposed parallel to the horizon, for tender plants, blossoms, and fruits, in the spring, to defend them against blasts, and pinching nights.

Horizontal shelters, says Miller, have by some persons been greatly recommended to preserve fruit-trees, but how little reason, or upon what slight experiments, every one that has ever made use of them will easily judge, especially those which are contrived by placing tiles in the walls, at certain distances; nothing being more obvious than that vegetables, when prevented from receiving the advantages of dews, rains, &c. the kindly benefits of heaven, grow weak, languid, and at last entirely decay: and from numbers of experiments, which have been lately made, we find that trees imbibe great quantities of nourishment through the pores of their leaves and branches, whereby they are rendered vigorous and healthy, even in such seasons, and upon such soils, where one would think it impossible they should receive much nourishment from the earth: to deprive them of this advantage, therefore, is no less than destroying them.

The only sort of shelter Mr. Miller approves of, for fruit-trees, is that made with two leaves of slit deal, joined over each other, and painted; these being fixed upon the top of the wall, with pullies, to draw up and down at pleasure, form a sort of penthouse, which are let down in great rains or cold nights, during the time that the trees are in flower, or the fruit is setting. But then, he observes, that these shelters should be removed away soon after the fruit is set, so that the trees may enjoy all the advantages of rain, dew, &c. in the summer, which are absolutely necessary to have healthy trees or good fruit.

HORN, *Cornu*, in physiology, a hard substance growing on the heads of divers animals, particularly the cloven-footed quadrupeds; and serving them both as weapons of offence and defence.

HORN is also a musical instrument of the wind kind, chiefly used in hunting, to animate the hunters and the dogs, to call the latter together.

The French-horn is bent into a circle, and goes two or three times round, growing gradually bigger and wider towards the end, which in some horns is nine or ten inches over.

HORN, in architecture, sometimes denotes a volute. See VOLUTE.

HORNS of *Insects*, the slender oblong bodies projected from the heads of those animals, and otherwise called antennæ. or feelers.

HORNBEAM, *Carpinus*, in botany, a genus of plants producing male and female flowers, which are apetalous; the male flowers are arranged into a cylindrical amentum, and the female are disposed in the same form; there is no pericarpium, but the amentum growing very large, contains at the base of each squamula, an oval angulated nut.

The timber of this tree is very tough and flexible, and therefore might be converted to many useful purposes, when suffered to grow to a proper size: the principal uses it has hitherto been applied to is turnery ware, for which it is excellent; and also for mill-cogs, beetle-heads, &c.

HORN-WORK, in fortification, a sort of out-work, advancing towards the field, to cover a curtain, bastion, or other place suspected to be weak, as also to possess an eminence, &c. It consists of two demi-bastions joined by a curtain; its flanks are usually parallel, though sometimes they contract towards the place, forming a queue d'aronde, or swallow's tail. When the flanks are too long, sometimes epaulements are made to flank them. The parts next the country are to be defended by a parapet. Two horn-works joined together make a crown-work.

HORNET, *Crabro*, in zoology, a species of apis with a black thorax, and double black spots on the segments of the body. See APIS.

HOROGRAPHY, the same with dialling. See the article DIAL.

HOROLOGIUM, a general name for instruments to measure the hours, as a watch, Clock, dial, &c. See WATCH, CLOCK, &c.

HOROPTER, in opticks, a right line drawn through the point where the two optick axes meet parallel to that which joins the centre of both the eyes.

Thus the line AB (*plate XLI. fig. 1.*) which is drawn through the point of concurrence of the optick axes of the eyes D and E, parallel to HI, which connects HI, the centres HI of the eyes HDE, is called the horopter; because it is found by experience to be the limit of distinct vision.

HOROSCOPE, in astrology, is the degree of the ascendant, or the star that rises above the horizon at a certain moment, which is observed in order to predict some future event, as the success of a design, the fortune of a person who was at that instant born, &c.

The same name is also given to a scheme or figure containing the 12 houses, in which are marked the situation of the heavens and stars, in order to form predictions. See HOUSE.

Lunar HOROSCOPE, the point from whence the moon proceeds when the sun is in the ascending point of the east.

HORSE, *Equus*, in zoology, a well known quadruped, the characters of which are these: the fore-teeth are six in number, the upper ones incurvated, and the inferior prominent: the canine teeth are not exerted, and are on each side separated by a space from the teeth: the hoof is undivided, and the teats are two, and placed in the groin.

The horse is one of the noblest quadrupeds we are acquainted with. In strength and natural fierceness, he is inferior to few, and yet easily tamed. The head is long and large: the eyes large, and prominent; the ears erect, and beautiful; the neck is long and thick, and elegantly decorated with a mane; the body is rounded, and beautifully turned; the legs are strong, without being bulky; and the tail is long, and hairy all the way; the hairs being like those of the mane, only longer, thicker, and more beautiful.

HORSE-CHESNUT, *Esculus*, in botany, a well-known tree, formerly planted in avenues; but they have a much better appearance when planted singly, as the natural growth of them is obtusely pyramidal, the under branches being always greatly extended, and the



the succeeding ones gradually decreasing to the top. It is propagated by planting the nuts early in the spring, and afterwards managed like the common chestnut, observing, in transplanting them, not to shorten any of the branches.

HORSE-CHESTNUT trees were originally brought from Constantinople to England; and although they are natives of so warm a climate, yet they resist the cold of the severest winters we have here, and grow to be very large. The fruit of this tree is very bitter, and the only use they are applied to here, is to feed deer, who are very fond of them; so that in large parks it is very proper to have a number of horse-chestnut trees, as they are not only ornamental but useful.

HORSE-DUNG, in gardening, is of particular use for hot-beds; whereby cucumbers, melons, asparagus, sallads, and other delicacies, are attained early in the spring; for which purpose no other sort of dung will do so well, if mixed with litter and ashes, as this; and when rotten will make a good manure for cold lands.

HORSE-RADISH, a well known species of cochlearia; it is propagated by cuttings or buds from the sides of the old roots; the season for this work is in October or February, the former for dry lands, and the latter month for wet.

HORSE-SHOE, in fortification, is a small work sometimes of a round and sometimes of an oval figure, inclosed with a parapet, sometimes raised in a moat or ditch, or in low grounds, and sometimes to cover a gate, or to serve as a lodgment for soldiers.

HORSE-SHOE-HEAD, a disease in infants, in which the futures of the skull lie too open.

This is commonly a sign of a weak constitution, and a short life. The nurses usually embrocate the parts affected with brandy or rum, to which some add the white of an egg, or palm oil.

HORSE-TAIL, in botany: See *EQUISETUM*.

HORSE, in a military sense, the same with cavalry. See *CAVALRY*.

The light-horse, in army, are all the regiments of horse, except the guards.

HORSE, among seamen, a rope fastened to the yards in two places, for the men to tread on, and secure themselves, when they go out to furl, reef, or to loosen the sails.

HORTICULTURE, the same with gardening. See *GARDEN* and *GARDENING*.

HORTUS SICCUS, a DRY GARDEN, an appellation given to a collection of specimens of plants, carefully dried and preserved.

Take a specimen of a plant in flower, and with it one of its bottom leaves, if it have any; bruise the stalk, if too rigid; slit it if too thick; spread out the leaves and flowers on paper; cover the whole with more paper, and lay a weight over all. At the end of 18 hours take out the plants, now perfectly flatted; lay them on a bed of dry common sand; sift over them more dry sand, to the depth of two inches, and thus let them lie about three weeks: the less succulent dry much sooner, but they take no harm afterwards. If the floor of a garret be covered in spring with sand two inches deep, leaving space for walking to the several parts, it will receive the collection of a whole summer, the covering of sand being sifted over every parcel as laid in. They need no further care, from the time of laying them, till they are taken up to be stuck on paper. The cement used is a solution of gum arabick in water.

Plants may be dried very well without sand, by only putting them frequently into fresh quires of paper, or a few by only pressing them between the leaves of a book; but the sand method preserves the colour best, and is done with least trouble.

HOSANNA, a Hebrew word, signifying, *Save now*, or *Save we beseech thee*; from the frequent use of which, during the feast of tabernacles, the whole solemnity got the appellation of *Hofanna rabba*.

HOSE, in commerce. See *STOCKING*.

HOSEA, a canonical book of the Old Testament, being the first of the less prophets, written by Hosea the son of Beer, who flourished in the reigns of

Uzziah, Jotham, Ahaz, and Hezekiah, kings of Judah.

The stile of this is pathetical, and full of short and lively sentences.

HOST, *Hospes*, denotes either a person who entertains another, or the person so entertained; but it is now generally used in the first of these senses.

HOST, or HOAST, *Hoflia*, in the church of Rome, a name given to the elements used in the eucharist, or rather to the consecrated wafer; which they pretend to offer up every day, a new host or sacrifice, for the sins of mankind.

HOSTAGE, a person given up to an enemy as a security for the performance of the articles of a treaty.

HOSTILITY, denotes a state of war or enmity between two nations.

During a truce all acts of hostility are to cease on both sides.

HOT-BEDS, in gardening, beds made with fresh horse-dung, or tanner's bark, and covered with glasses to defend them from the cold winds. By the skilful management of hot-beds we may imitate, the temperature of warmer climates, by which means the seeds of plants brought from any of the countries within the torrid zone may be made to grow and flourish. Beds made of horse-dung are proper to make the seeds of different plants to come up soon, particularly those that require a very strong heat; but as this heat is not so permanent as of tanner's bark, the last mentioned is to be preferred. As to the method of making hot-beds, it is better seen than described, as is likewise the management of them.

HOT-HOUSE, in salt-making, the place where they dry the salt, when taken out of the boiling pan: it is situated near the furnace, which, by means of funnels or tubes, conveys a heat into it.

HOT-HOUSE, or stove, in gardening, a conservatory *XLI. fig. 2.*) is exhibited a view of a hot-house peculiarly adapted for raising and bringing to perfection the for the preservation of tender exotick plants. In (*plate ananas, or pine-apple. In the ground plan, (plate XLII. fig. 8.) a a a a*, are four pits for containing the bark, in which the plants are plunged; the two middle pits are for fruiting plants; the other two may be used for small plants called Succession, or, if not, they are well adapted for melons: *b b* are the fire places, covered with sheds; the dark parts round the two inner pits represent the flues which terminate at the chimneys built over the fire-places. The section and perspective view are so obvious, that they require no references, as the scale will determine all the parts.

As this construction seems to be out of the common way of building of hot-houses, it may therefore be objected to; but we can see but little inconvenience in it; and as to the conveniency attending the welfare of the plants, we think it better than those built in the common forms; for, in the first place, this will have the morning sun sooner, and the evening sun later, than the other sort, and likewise the mid-day sun; and although the rays at that time will fall obliquely, we think it of service in very hot days, at which times the common stoves are obliged to be shaded, to prevent the plants from being burnt, but in this construction it is not necessary: also in winter, when the sun issues but little warmth except at noon, then the upright glasses in front receive the rays almost perpendicularly; whereas in the common stoves the obliquity of the glasses render the rays inefficacious, being of no other use but to transmit light. Another conveniency attends this new form, that is, the air can be admitted at either side, according to the wind, or both, in very hot weather, which cannot be done by the other; and likewise in very cold weather, the windward side can be kept covered (either with canvas or shutters, which are necessary for both on nights) while the other side is open, it will therefore have both warmth and light. We must therefore be of a strong opinion, that this construction, if put in execution, will answer all the purposes intended, and shall remain in the same mind till it is proved to the contrary.

HOTCH-POT, in law, is used for mixing of lands given



given in marriage with other lands in fee which fall by descent: as where a man possessed of thirty acres of land has issue only two daughters, and after his having given with one of them ten acres in marriage, he dies possessed of the other twenty: here she that is thus married, in order to gain her share of the rest of the land, must put her part given in marriage in hotch-pot; that is, she must refuse to take the sole profits of her lands, and cause it to be mingled with the other, so that an equal division may be made of the whole between her and her sister; by which means, instead of only her ten acres, she has fifteen.

**HOTTONIA**, water violet, in botany, an aquatick plant, growing in standing waters in many parts of England; the leaves are finely winged, the flower-stalks rise a little above the water; they are naked, and towards the top have two or three whorles of flowers, each of which is monopetalous and saucer-shaped. The fruit is a globose pointed capsule, with one cell containing a number of round seeds.

**HOTTS**, or **HUTTS**, are the pounces and round balls of leather, stuffed, and tied to the spurs of fighting cocks, to keep them from hurting one another in sparring.

**HOUND**, a hunting dog, of which there are several sorts, as the grey-hound, gaze-hound, and the blood-hound.

**HOUNDS of the Mast**, in the sea-language, those parts of the upper-end or head of a mast upon which the cheeks are bolted to support the trussel-trees.

**HOURL**, *Hora*, in chronology, an aliquot part of a natural day, usually a twenty-fourth, sometimes a twelfth. But the word hour has not always been of the same signification; for in ancient times an hour did indefinitely express a short space of time. It is thought too that anciently the four seasons of the year, wherein the sun finisheth its annual course, had the name of hours, because horus instituted a certain year, consisting of three months, and for this reason the ancients called spring, summer, autumn, and winter, hours, and the year itself horus: of which some footsteps appear in this, that the Greeks called their annals hori; and the writers of them, horographi. However it be, the division of the day into hours is very ancient, though the most ancient hour is that of the 12th part of the day.

An hour, with us, is a measure or quantity of time, equal to a 24th part of the natural day, or nychthemeron; or it is the duration of the 24th part of the earth's diurnal rotation. Fifteen degrees of the equator answer to an hour; though not precisely, yet near enough for common use.

There are divers kinds of hours used by chronologers, astronomers, dialists, &c. Sometimes hours are divided into equal and unequal. Equal hours are the 24th part of a day and night precisely, that is, the time wherein  $15^{\circ}$  of the equator mount above the horizon. These are called equinoctial hours, because they are measured on the equinoctial; and astronomical, because used by astronomers. They are also differently denominated, according to the manner of accounting them in different countries. Astronomical hours are equal hours, reckoned from noon, or mid-day, in a continued series of twenty-four. Babylonish hours are equal hours reckoned in the same manner from sun-rise. The Italian hours are also equal hours reckoned in the same manner too, from sun-setting. European hours are also equal hours, reckoned from midnight; 12 from thence to noon, and 12 more from noon to midnight. Jewish, or planetary, or ancient hours, are the 12th part of the artificial day and night, each being divided into 12 equal parts. Hence, as it is only in the time of the equinoxes that the artificial day is equal to the night, it is then only that the hours of the day are equal to those of the night. At other times they will be always either increasing or decreasing. And they will be the more or less unequal according to the obliquity of the sphere.

**HOUSE**, *Domus*, a habitation, or place built with conveniences for dwelling in; thus, we say, a town-house, country-house, &c.

A country-house is the villa of the ancient Romans, the quinta of the Spaniards and Portuguese, the closerie

and cassine of the French, and the vigna of the Italians. It ought always to have wood and water near it; these being the principal beauties of a rural seat. The trees make a far better defence than hills, as they yield a cooling and healthy air, shade during the heat of summer, and very much break the severities of winter season.

It should not be situated too low; on account of the moisture of the air; and, on the other hand, those built on places exposed to the winds are expensive to keep in repair. In houses not above two stories high, and upon a good foundation, the length of two bricks, or eighteen inches, for the heading course, will be sufficient for the ground-work of any common structure; and six or seven courses above the earth, to a water-table, where the thickness of the walls are abated, or taken in, on either side the thickness of a brick, viz. two inches and a quarter. But for large and high houses of three, four or five stories, with garrets, their walls ought to be three heading courses of bricks, or 28 inches at least, from the foundation to the first water-table; and at every story a water-table, or taking in, on the inside, for the summers, girders, and joists to rest upon, laid into the middle, or one quarter of the wall at least, for the better bond. But as for the partition wall, a brick and half will be sufficiently thick; and for the upper stories, a brick length, or nine-inch brick wall will suffice.

**Town House**, a public hall, where the magistrates of a town or borough, hold their meetings for the due administration of their polity.

**Work-House**, a public place built at the charge of a county, town or parish, where indigent, vagrant and idle people, as also strumpets, gamesters, and other rogues, are set to work, and furnished with clothing, diet, &c. Such are the London work-house, Bridewell, and that of the parish of St. Margaret, Westminster.

The justices, at their sessions, are required to appoint governors, or masters of such houses, whose office is to set the persons committed to their charge to work, and to give them moderate correction by whipping, &c. if refractory; and to render a true account every quarter-sessions, of persons committed into their custodies.

**HOUSE-BOTE**, in law, an allowance of timber out of the lord's woods, for the repairs of an house: this is otherwise called estovers.

**HOUSE** is also used for a noble family, or race of illustrious persons, descended from the same stock.

**HOUSE**, in astrology, denotes the 12th part of the heavens. The division of the heavens into houses is founded upon the influence of the stars, when meeting in them, on all sublunary bodies. These influences are supposed to be good or bad, and to each of these houses particular virtues are assigned, on which astrologers prepare and form a judgment of their horoscopes. The horizon and meridian are two circles of the celestial houses, which divide the heavens into four equal parts, each containing three houses; six of which are above the horizon, and six below it.

**HOUSHOLD**, the domesticks of a prince, or private person. The civil government of the king's court belongs chiefly to the lord-steward, having authority over all officers and servants except those of the chapel, chamber and stable. Under the lord steward are a treasurer of the household, comptroller, cofferer, master of the household clerks of the green cloth, &c. The troops of the household are the horse-guards, horse-grenadiers, and foot-guards.

**HOUSHOLD Days**, are four solemn festivals in the year, when the king after divine service offers a bezant of gold to God on the altar. These days are Christmas, Easter, Whitsunday, and All-Saints, and are part of the twelve collar and offering days.

**HOUSING**, or **HOUSE**, a cover laid over the saddle of a horse, to preserve it from the weather, &c.

**HOWKER**, or **HOOKER**, a vessel much used by the Dutch, built somewhat like a pink, but rigged and masted like a hoy: they carry from 50 to 200 tons, and with a few hands will sail to the E. Indies.

**HOYSE**, or **HOISE**, in the sea-language, is hawling up any thing into a ship.

**HOZING of Dogs**, cutting out the balls of their feet.



**HUE AND CRY**, *Hutesum & Clamor*, the pursuit of one who has committed felony, &c. on the highway.

If a person robbed, or any in the company of one murdered or robbed, come to the constable of the next town, and require him to raise hue and cry, or to pursue an offender, describing him, and shewing which way he is gone; the constable is forthwith to call for aid from the parish to seek the felon; and if he be not found there, to give the next constable warning till he be apprehended or pursued to the sea-side. The Normans had a cry after offenders, not unlike this, called *Clamor de Hare*.

**HUGUENOTS**, an appellation given the reformed or Calvinists of France, by way of contempt.

**HULKS**, large vessels, that have their gun-decks from 113 to 150 feet long, and from 31, to 40 broad. They will carry from 400 to 1000 tons. They chiefly serve to set masts into ships, &c.

**HULL** of a ship, her main body without masts, sails, yards, &c.

**HUMAN**, in general, is an appellation given to whatever relates to mankind: thus we say, the human soul, the human body, human laws.

In order to form a just idea of the human body, says Dr. Mead, it ought to be considered as an hydraulick machine, contrived with the most exquisite art, in which there are numberless tubes, properly adjusted and disposed, for the conveyance of fluids of different kinds, as the blood, animal spirits, lymph, &c.

The solids likewise make a very necessary part of the human body; some, as the bones, serving as supports and levers to regulate its motions; others, as the intestines and blood vessels, serving to prepare and convey nourishment to its various parts; and finally, others, as acting under the direction of the mind like so many ropes and pulleys.

As therefore health consists in the regular motions of the fluids, together with a proper state of the solids, it is next to a miracle that so complicated a machine should hold out to extreme old age: for a body, such as ours, cannot possibly retain a life for ever; which is not difficult to account for, because the membranous fibres of the blood-vessels, which were made elastick in order to drive their included juices forward, become gradually harder, and at length rigid; whence they are rendered incapable of executing their offices and the secretions of the several parts are diminished by degrees: and that this is the case, appears from the dissections of the bodies of very old people; the insides of their arteries being sometimes found ossified here and there, whereby they had almost entirely lost their sprightliness; and the orifices of the natural ducts, are often observed to be quite cartilaginous.

**HUMANITY**, the peculiar name of man, whereby he is distinguished from all other beings. See **MAN**.

**HUMANITIES**, in the plural, signify grammar, rhetoric and poetry, known by the name of literæ humaniores.

**HUMECTATION**, moistening, in pharmacy, the preparing of a medicine, by steeping it a-while in water, in order to soften it when too dry, or cleanse it and prevent its subtil parts from being dissipated in grinding, &c. It also denotes the application of moistening or suppling remedies.

**HUMERUS**, or *Os Humeri*, in anatomy, the bone of the arm properly called the shoulder-bone.

**HUMID**, *humidum*, moist. The school philosophers make water the primum humidum, the cause or principle of humidity in others, which are more or less moist, as they partake more or less of this element.

**HUMIDITY**, moisture, the quality of wetting other bodies. Aristotle defines humidity by a passive quality which indisposes a body from being retained within its own bounds, but makes it easily retained in those of another; this is the same with his definition of fluidity.

Others of the peripateticks define it a quality disposed to moisten other bodies, and thereby soften and dispose them to receive any impression.

The moderns consider humidity as a particular spe-

cies of fluidity, and define it a fluor, which, being applied on a solid body, adheres thereto, and communicates the quality to other bodies. Others somewhat more accurately call humidity the power whereby a body moistens another; but what this power is they do not shew.

Of this we are certain, that humidity is only a sort of relative mode; so far as the component particles of a fluid compared with respect to the pores and particles of other bodies or their texture, are apt to enter those pores, or stick to those particles; so far is that fluid humid: on the contrary, so far as there is repugnance between the particles, &c. in respect of such bodies, the fluid is not humid. Water, which is the great standard of moisture, does not wet all things, for it stands or runs off on the leaves of cabbages, &c. and it will not wet the feathers of ducks, &c. Add to this, that the texture alone may not cause the fluid to be humid; in that neither quicksilver alone, lead, or bismuth, will stick upon glass; yet when mixed together they will, as we find is done in foliating looking-glasses therewith.

**HYMIDUM**, *Radicale*, or radical moisture. This in fact seems to amount to no more than the purest and most defecated part of the nutritious matter, in a condition ready to be assimilated. By too great heat, as in fevers, hecicks, &c. this humidity is too hastily exhausted.

**HUMILIATION**, the act of humbling a person's pride in contradistinction to mortification; the former bringing down the mind, whilst the latter subdues the flesh.

**HUMORISTS**, *Gli Humoristi*, a celebrated academy established in Italy by Paul Mancini, who, by means of Gaspar Salviam assembled together all the men eminent for learning about Rome, and formed them into a society. The device of this academy is a cloud, which being raised from the salt water of the sea, returns again in fresh, with this hemistich from Lucretius. *Redit agmine dulci*.

**HUMOROSI**, the name of another academy established at Cortona in Italy.

**HUMOUR**, *Humor*, in general, signifies the same as liquor, or liquid.

**HUMOUR**, in medicine, denotes any juice or fluid part of the body, as the chyle, blood, fat, serum, lymph, spirits, bile, semen, salival and pancreatick juices, &c.

The ancients seem to have called the nutritious juices the radical humour, and to have constituted, as a cause of diseases, a disproportion between the innate heat and radical moisture.

Phlegm, blood, bile, and melancholy, are the four humours so much talked of by the ancient physicians, which they suppose to moisten the whole body of animals, and to be the cause of the divers temperaments thereof. But the moderns rather chuse to distinguish the humours into nutritious, called also elementary, as chyle and blood; those separated from the blood, as bile saliva, urine, &c. and those returned into the blood.

Humours are again distinguished into natural or salutary, and morbid or corrupted; the former being the juices commonly secreted for the uses of the body; the latter those compound humours, which, thickening and growing putrid, cause tumours, abscesses, obstructions, and most diseases: these are variously denominated, as malignant, adust, acrimonious, corrosive, crude, peccant, &c.

**HUMOUR** also signifies the particular temperament of a person, considered as rising from the prevalence of this or that humour of the body.

**HUMOURS of the Eye**; anatomists and opticians distinguish three sorts, the aqueous, crystalline, and vitreous. See **EYE**.

**HUMOUR**, in dramatick poetry, is also used for a subordinate species of what the critics call manners; it is considered as a weaker habitual passion peculiar to comick characters, as being chiefly found in persons of a lower degree than those proper for tragedy. Humour is looked upon peculiar to the English drama; at least



our comick poets have excelled therein beyond any other nation; and perhaps ours is the only language that has a name for it. Every passion has two different faces; one that is serious, great, and solemn, which is for tragedy; and another that is low, ridiculous, and fit for comedy; and this last is what we call humour.

The duke of Buckingham makes humour all in all: wit, according to him, should never be used, but to add an agreeableness to some just sentiment, which, without some such turn, might pass without its effect.

**HUNDRED**, *Centum*, *Cent.* is ten times ten, or the square of ten. It makes the third place from the right to the left in the table of numeration.

The proportion of the profits in commerce is reckoned by the hundred, or so much per cent.

**HUNDRED**, *Hundredum*, *Centuria*, a certain division or part of a shire or county.

**HUNGARY Water**, *Aqua Hungarica*, a distilled water, so called from a queen of Hungary, for whose use it was first prepared. It is one of the distilled waters of the shops, and is directed in the college dispensatory to be made of rosemary flowers infused some days in rectified spirits of wine, and then distilled. Its virtues are much the same with those of the simple it is drawn from.

**HUNGER**, *Fames*, a natural appetite for food.

There are various opinions as to the nature, cause, and definition of hunger, it having been controverted from Aristotle to our time. Galen defines it a painful sensation, arising from a divulsion of the stomach: the other Peripateticks call it an appetite of hot and dry: both which systems some authors take in, and define hunger a natural appetite of hot and dry, occasioned by a painful divulsion of the membranes of the stomach, arising from an emptiness thereof. But the moderns consider hunger as owing to the sharpness of the liquor contained in the stomach, or continually discharged from the excretory ducts of the neighbouring glands, which, vellicating it fibres, occasions this uneasy sensation.

This juice some will have to be acid, by reason bodies of that class are used to whet the appetite. Others will have the dry attrition of the coats of the stomach to be the only cause.

Others think the blood derived from the adjacent ramifications of arteries into the stomach sufficient to account for hunger, without the mediation either of attrition or the menstruum. The mass of blood itself, they observe, is rendered acid through abstinence from food; its soft balsamick parts having been carried over all the body, and lodged therein as nutriment, to supply the absence of those worn off and exhaled. To which it may be added, that the velocity of the blood is considerably augmented a good while after eating, beyond what it was during digestion.

Hence it follows, 1. That persons of a bilious constitution, young people, and those who labour hard, must sooner find themselves hungry than others. 2. That hunger, if it holds long, occasions a violent heat, and sometimes a fever. 3. That those whose humours are viscid are less incommoded than others with hunger.

**HUNGRY EVIL**, an unnatural greediness in a horse to devour his meat faster than he can chew it; and may be known by his snatching at it, as if he would devour it whole.

**HUNTING**, the art or act of chasing and taking beasts of game. Hunting was originally considered as a right made over to man, and the succeeding ages appear to have been of the same sentiment. Accordingly, we find that, among the more civilized nations, it made one of their genteeler diversions, and as to the more barbarous, it procured them food and necessaries. The Roman jurisprudence, which was, formed on the manners of the first ages, established it as a maxim, that as the natural right of things which have no master belongs to the first possessor, wild beasts, birds, and fishes, are the property of whosoever can take them first. But the northern nations of Barbarians who over-run the Roman empire being now possessed of other and more easy means of subsistence from the lands of those they had vanquished, their chiefs began to appropriate the

right of hunting, and make it a royal right, and so it continues to this day. Hence all our laws and charters the forest, &c.

Hunting is practised in a different manner, and with different apparatus, according to the nature of the particular beast which is the object thereof. These beasts are the hart, hind, hare, boar, wolf, buck, doe, fox, marten, and roe; the five first whereof are denominated beasts of the forest, or venery, sylvestres; and the five latter, beasts of the field or chace, campestres.

The hunting used by the ancients was much like that practised for the rain-deer, which is only drawn with a blood-hound, and forestalled with nets and engines. Hunting, as practised among us, is chiefly performed with dogs, of which we have various kinds. On some occasions nets, spears, instruments, &c. for digging the ground, are also required, nor is the hunting-horn to be omitted. With regard to the seasons, hart and buck hunting begins a fortnight after midsummer, and lasts till Holy-rood-day: the hind and doe come in course on Holy-rood-day, and last till Candlemas: fox-hunting comes in at Christmas, and holds till the Annunciation: roe-hunting begins at Michaelmas, and ends at Candlemas: hare-hunting commences at Michaelmas, and goes out at the end of February. Where the wolf and boar are hunted, the season for each begins at Christmas; the first ending at the Annunciation, the second at the Purification.

**HURDLES**, in fortification, twigs of willows or others interwoven close together, sustained by long stakes, and usually laden with earth. Hurdles, called also clays, are made in the figure of a long square; the length being five or six feet, and the breadth three, or three and a half: the closer they are woven, the better. They serve to render batteries firm, or to consolidate the passage over muddy ditches; or to cover traverses and lodgments, for the defence of the workmen, against the fire-works, or the stones that may be thrown against them.

**HURDLES**, in husbandry, certain frames made either of split timber, or of hazle-rods, wattled together, to serve for gates in inclosures, or to make sheep-folds, &c.

**HURLE-BONE**, in a horse, a bone near the middle of the buttock, very apt to go out of its sockets with a hurt or strain.

**HURRICANE**, a furious storm of wind, owing to a contrariety of winds. See **WIND**.

**HUSBAND**, *Maritus*, a man joined or contracted with a woman in marriage.

**HUSBANDRY** denotes much the same with agriculture. See **AGRICULTURE**. As there is no subject of more general advantage than the cultivation of lands, we have given the operations and improvements thereof under their respective articles.

**HUSK**, the same with what botanists call the calyx, or cup of a flower. See **CALYX**. Petiver, of the verticillate plants, as sage, rosemary, and the like, says, that it is an erroneous, though general opinion, that the flowers of these plants contain their principal medicinal virtues, the husks being the part in which this is lodged. Thus, for instance, the fine scent of hungary-water is not owing to the flowers but husks of rosemary; since the flower alone, when clean picked of them, yields very little odour. See **HUNGARY-WATER**.

**HUSSARS**, a kind of irregular cavalry, armed with the sabre and bayonet; are retained in the service of most princes on the continent.

**HUSSITES**, the disciples of John Huss, a Bohemian, and curate of the chapel of Bethlehem at Prague; who, about the year 1414, embraced and defended the opinion of Wickliff of England, for which he was cited before the council of Constance, and refusing to renounce his supposed errors, he was condemned to be burnt alive, which sentence was accordingly executed upon him at Constance.

**HYACINTH** *Hyacinthus*, in botany, a genus of plants, whose root is bulbous, with smooth long leaves, which arise immediately from the root. The flowers are produced in spikes, placed alternately, each consisting of a monopetalous campanulated corolla, divided into six reflexed segments at the limb, with three nectariums



riums placed on the top of the germen. The stamina are six short subulated filaments, topped with connivent antheræ. The fruit is a roundish triquetrous, divided into three cells, each of which usually contains two roundish seeds. The double hyacinths, of which there are great variety, are muchesteemed for their fragraney and beauty. They are propagated by offsets, or from seeds.

**HYACINTH**, in natural history, a genus of pellucid gems, whose colour is red with an admixture of yellow.

**HYADES**, in astronomy, seven stars in the bull's head, famous among the poets for the bringing of rain. The principal of them is in the left eye, called by the Arabs Aldebaran. See **ALDEBARAN**.

**HYDATIDES**, in medicine, little transparent vesicles, or bladders, full of water, sometimes found solitary, and sometimes in clusters, upon the liver, and various other parts, especially in hydropical constitutions. But in a particular sense, the hydatid is a disease of the eye-lids, called also aquula. St. Yves informs us, that there sometimes comes on the edge of the cartilages of the eye-lids, or on the conjunctiva, an elevation like the bladders which appear on the skin after burns. They are as big as a pea, or a lentil; are filled with a very clear liquor, and have the name of hydatides from the lymph which they contain. Sometimes a serosity is extravasated between the conjunctiva and the membrane which covers it: it separates these membranes, and in the movement of the eye, a sort of wrinkle appears, which shews that a serosity stagnates between these membranes, and produces the swelling. This disease is not at all dangerous; it is a little troublesome when it seizes only part of the conjunctiva. The surest remedy is to prick it dexterously with the point of a lancet, and to lay it open according to the longitudinal direction of the tumour, without any other application.

**HYDATOIDES**, the same with the aqueous humour of the eye. See **EYE**.

**HYDRAGOGUES** ὑδραγωγα, among physicians, remedies which evacuate a large quantity of water in dropsies. Quincy observes, that the strongest catharticks chiefly answer to the character of hydragogues, in that by their forcibly shaking and velicating the bowels, and their appendages, they squeeze out water enough to make the stools appear little else.

The principal hydragogues, in the common opinion, are the juices of elder, of the root of iris, of soldanella, mechoacan, jalap, &c. In the general, all sudorifick, aperitive, and diuretick medicines, are truly hydragogues.

**HYDRANGÆA**, in botany, a genus of the decandria digynia class. The capsule has two cells, and a double beak. There is but one species, a native of Virginia.

**HYDRAULICKS**, that part of statics which considers the motion of fluids, with the application thereof, particularly in artificial water-works.

The word is Greek, ὑδραυλις, an organ, and formed of ὕδωρ, water, and αὐλὴ, a pipe, as, at the first invention of organs, a fall of water was employed to produce a wind to sound them, the inventor being unacquainted with the method of applying bellows thereto. See **HYDROMETER**.

Hydrostatics explain the equilibrium of fluids at rest; upon removing which equilibrium motion ensues, and hydraulicks commence. Hydraulicks, therefore, suppose hydrostatics; and the generality of writers, from the immediate relation between the two, join them together, and call them both either hydraulicks or hydrostatics.

Among the Greeks Aristotle was the first that wrote of the equilibrium of fluids, and reduced the flight of birds, the motion of fishes, and the direction or steering of ships, to the rules of mechanicks.

It is well known with what address Archimedes, who came after Aristotle, discovered the cheat of the goldsmith of king Hiero. The latter, suspecting that the workmen had allayed the gold with more silver than was necessary, sent to the philosopher to examine and detect the fraud: he was long at a loss to think of any method

of doing it, till one day getting into a tub full of water to bathe himself, he observed, that as he entered the tub, the water ran out; and he immediately saw it must follow, that if the tub were full, the water which ran out upon his immersion must be equal in bulk to his body.

This famous mathematician also invented that cochlea or screw, which by the motion of an inclining cylinder makes the water rise, while the other falls. The water acts by its own gravity in this simple machine, but it cannot be carried very high.

Ctesibius, by making use of a more compounded machine, which has kept the name of its inventor, knew how to make the water rise to all sorts of heights, and is in use at present, as are the several other sorts of pumps. But of the inventions of the ancients there is none of greater importance than that of water-mills; for, as Vitruvius describes them, they seem to have resembled ours pretty much. It is true they were not so common then as they are now-a-days.

The moderns knew but little of hydrostatics before Galilæo. This great man being of the same opinion with the ancients, that there was no vacuum in nature, attributed the elevation of the water in the sucking pump to the abhorrence of a void. Torricelli, his disciple, remarked, that when a tube close at the upper end was immersed into a vessel full of mercury, the mercury remained suspended in the tube at a certain height, and that it fell into the vessel when the tube was open. Torricelli communicated this experiment, but without referring it to the true cause; but by repeating it often, he conjectured that it might be the effect of the weight of the air. See **BAROMETER**.

M. Pascal laid hold of the notion, and after being assured of the fact by experiments which he had made, and published anno 1647, he endeavoured in 1648 to certify himself of the cause: and at length from his experiments he knew what Torricelli had only conjectured. And what the great duke's mathematician had said doubtfully, M. Pascal demonstrated by the famous experiment he made on the pit of Domme, and afterwards in treatises he published.

The experiments which have been made, in order to know the properties of fluids, moved M. Mariotte to make several observations which had not been touched on before: thereby he enriched the hydraulicks with a number of discoveries on the measure and expence of conveying water, according to the different heights of the reservoirs and their various adjuncts. Afterwards he examined what concerns the conducting of water, and the strength which the pipes required for resisting their different gravities.

M. Mariotte had a good deal of knowledge and dexterity in removing difficulties, and was singularly happy in making experiments, which he made for the most part at Chantilly, and at the royal observatory. He nevertheless neglected what concerned the different pumps and other machines which might raise water. This part of the hydrostatics had been touched but very imperfectly, when the chevalier Morland undertook to treat of it. If he hath not exhausted the subject, he has at least given light enough for carrying on the theory and practice of it very far.

**HYDRELÆUM**, in pharmacy, a mixture of oil and water, which Galen reckons refrigerating.

Taken inwardly, it provokes vomiting; and externally, it is anodyne, and promotes suppuration.

**HYDRENTEROCELE**, in surgery, a kind of tumor or hernia, where there is a dropsy of the scrotum, complicated with a descent of the intestine.

**HYDROCANISTERIUM**, an engine which spouts water in great quantities, and to considerable heights, in order to extinguish accidental fires in houses. See **ENGINE**.

**HYDROCELE**, *Hernia*, in surgery, a swelling or dropsy in the scrotum. See **HERNIA**.

**HYDROCEPHALUS**, in surgery, a preternatural tumor of the head arising from preternatural lymph.

It is of two sorts, internal and external; internal, when the water is collected within the bones of the cranium; external, when retained between the skin and cranium.



cranium. The first kind is rarely seen but in new-born infants, who are generally in great danger: for, upon an incision, the lymph is no sooner discharged, than the infant dies, as experience has too often convinced us. If the distemper be recent, it will be more adviseable to repeat gentle purges; whilst a large compress, dipped in lime-water, spirit of lavender, or Hungary-water, is applied outwardly.

**HYDROCOTYLE**, marsh-penny-wort, in botany, a genus of plants, the universal corolla of which is uniform in figure, though not in situation; and the single corolla are formed of five ovato-acute, patent petals: the fruit is orbicular, erect, and composed of two compressed and semi-orbicular seeds. This plant is common with us in damp places, and is suspected of hurting sheep that feed on it; whence it is sometimes called white-rot.

**HYDROGRAPHY**, that part of geography which considers the sea as it is navigable. It teaches how to measure the sea; gives an account of its tides, counter-tides, currents, soundings, bays, &c. as also its rocks, shelves, sands, promontories, harbours, distances from port to port, both at sea and on the coast.

**HYDROMANCY**, the art of foretelling future events by means of water; the same as hydrotoscopy.

The word is Greek, and formed of *υδωρ*, the water, and *μαντεια*, divination.

The other kinds of divination relative to fire, air, and earth, are denominated pyromancy, aeromancy, and geomancy.

**HYDROMEL**, *Hydromeli*, among physicians, water impregnated with honey, either before or after fermentation: that made by fermentation is called vinous hydromel, or mead, and is esteemed good for the gravel.

**HYDROMETER**, an instrument to measure the gravity, density, velocity, force, &c. of water and other fluids.

The hydrometer is one of the most useful instruments of the philosophick kind; for though the hydrostatical balance be the most general instrument for finding the specifick gravities of all sorts of bodies, yet the hydrometer is best suited to find those of fluids in particular, both as to ease and expedition.

This instrument should be made of copper, since ivory imbibes spirituous liquors, and thereby alters its gravity; and glass is apt to break. The most simple kind, used for finding the strength of spirits, consists of a copper-ball *B b* (*plate XLII. fig. 5.*) with a brass-wire, *A B*,  $\frac{1}{4}$  of an inch thick, soldered into it. The upper part of this wire being filed flat on one side, is marked proof at *m*, because it sinks exactly to this mark in proof-spirits. There are other two marks at *A* and *B*, to shew whether the liquor be  $\frac{1}{10}$  above or below proof, according as the hydrometer sinks to *A* or emerges to *B*, when a brass-weight as *C* or *K* has been screwed on at the bottom *c*. There are also weights to be screwed on, for shewing the specifick gravities of fluids quite to common water. The round part of the wire above the ball, may be marked so as to represent river-water when it sinks to *R W*, (*fig. 6.*) the weight which fits the instrument for river-water being screwed on at *c*: also when put into spring-water, mineral-water, sea-water, and water of salt-springs, it will emerge or rise gradually to the marks *S P*, *M I*, *S E*, *S A*; and, on the contrary, when put into Bristol-water, rain-water, port-wine, and mountain-wine, it will successively sink to the marks *br*, *ra*, *po*, *mo*.

Another kind, which serves to distinguish the specifick differences of fluids to great nicety, consists of a large hollow ball *B*, (*fig. 7.*) with a smaller ball *b* under it, partly filled with quick silver or small shot, and screwed on to the lower part of the former, in order to render it but little specifically lighter than water: it has also a small short neck at *C*, into which is screwed the graduated brass-wire *A C*, which by its weight causes the body of the instrument to descend in the fluid, with part of the stem.

When this instrument is swimming in the liquor, contained in the jar *I L M K*, the part of the fluid displaced by it, will be equal in bulk to the part of the instrument under water, and equal in weight to that of

the whole instrument. Suppose the weight of the whole were 4000 grains, then it is evident we can by this means compare together the different bulks of 4000 grains of various sorts of fluids. For if the weight *A* be such as shall cause the ærometer to sink in rain-water, till its surface comes to the middle point of the stem *20*; and if, after this, it be immersed in common spring-water, and the surface observed to stand  $\frac{1}{10}$  of an inch below the middle point *20*; it is evident that the same weight of each water differs in bulk only by the magnitude of  $\frac{1}{10}$  of an inch in the stem.

Now suppose the stem were ten inches long, and weighed 100 grains, then every tenth of an inch would be one grain weight; and since the stem is of brass, and brass is about eight times heavier than water, the same bulk of water will be equal to  $\frac{1}{8}$  of a grain; and consequently to the  $\frac{1}{8}$  of  $\frac{1}{1000}$  part, that is, a 32000th part of the whole bulk, which is a degree of exactness as great as can be desired. Yet the instrument is capable of still greater exactness, by making the stem or neck consist of a flat thin slip of brass, instead of one that is round or cylindrical: by this means we increase the surface, which is the most requisite thing; and diminish the solidity, by which the instrument is rendered more exact.

In order to adapt this instrument to all sorts of uses, there ought to be two different stems to screw on and off in a small hole at *a*. One stem should be such a nice thin slip of brass, or rather of steel, like a watch-spring set straight, as we have just mentioned, on one side of which ought to be the several marks or divisions, to which it will sink in various sorts of waters, as rain-water, river-water, spring-water, salt spring-water, &c. And on the other side you mark the division to which it sinks in various lighter fluids, as hot Bath-water, Bristol-water, Lincomb-water, Cheltenham-water, port-wine, mountain, madeira, and various other sorts of wine. But in this case the weight *A* on the top must be a little less than before, when it was used for the heavier waters.

But, in case of trying the strength of spirituous liquors, a common cylindrick stem will do best, because of its strength and steadiness; and this ought to be so contrived that, when immersed in what is called proof-spirit, the surface of the spirit may be upon the middle point *20*; which is easily done by duly adjusting the small weight *A* on the top, and making the stem of such a length that, when immersed in water, it may just cover the ball, and rise to *a*; but, when immersed in pure spirit, it may arise to the top at *A*; then by dividing the upper and lower parts *a 20*, *A 20*, into ten equal parts each, when the instrument is immersed in any sort of spirituous liquor, it will immediately shew how much it is above or below proof.

This proof-spirit consists of half water and half alcohol, or pure spirit, that is, such as when poured upon gunpowder, and set on fire, will burn all away, and permit the powder to take fire, which it will, and flash as in the open air. But if the spirit be not so highly rectified, there will remain some phlegm or water, which will make the powder wet, and unfit to take fire. This proof-spirit of any kind, weighs seven pounds twelve ounces per gallon.

The common method of shaking the spirits in a vial, and by raising a crown of bubbles, to judge by the manner of their rising or breaking away whether the spirit be proof or near it, is very precarious and capable of great fallacy. There is no way so easy, quick, certain, and philosophical, as this by the ærometer, which will demonstrate infallibly the difference of bulks, and consequently specifick gravities, in equal weights of spirits, to the 30, 40, or 50 thousandth part of the whole, which is a degree of accuracy, beyond which nothing can be desired. See **ARÆOMETER**.

**HYDROMETRY**, *Hydrometria*, the mensuration of fluids, their gravity, velocity, quantity, &c. The word is of the same original with the preceding. It includes both hydrostaticks and hydraulicks.

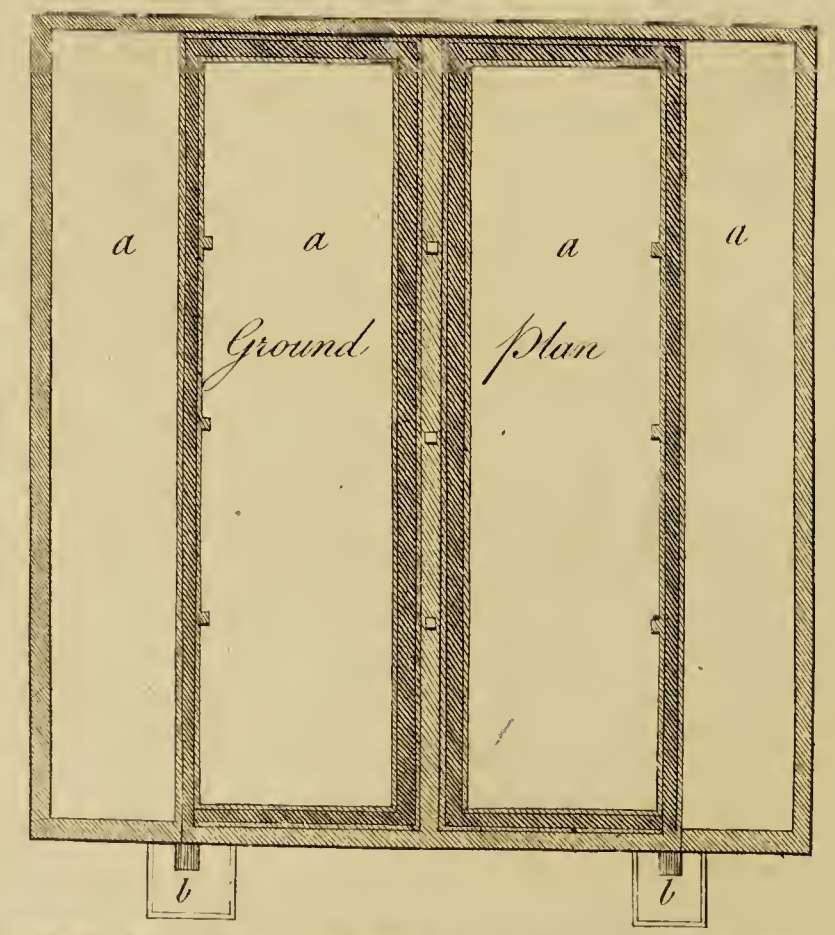
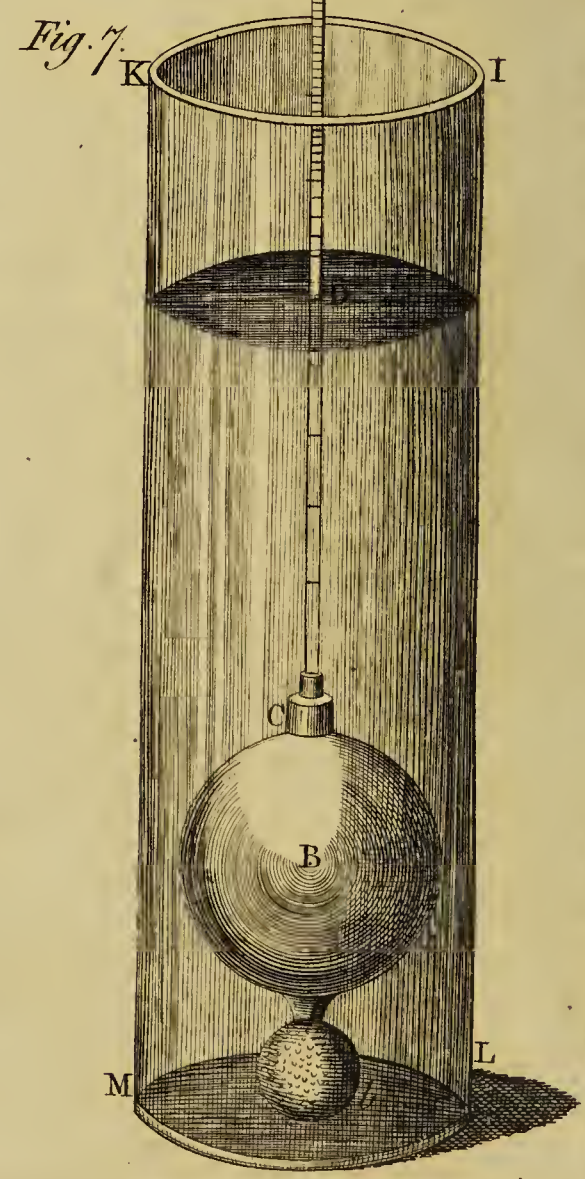
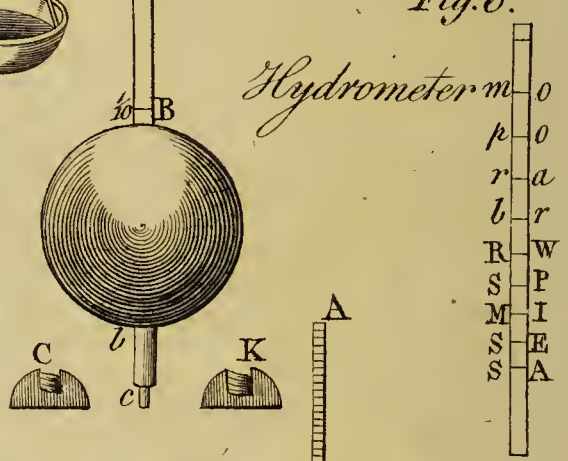
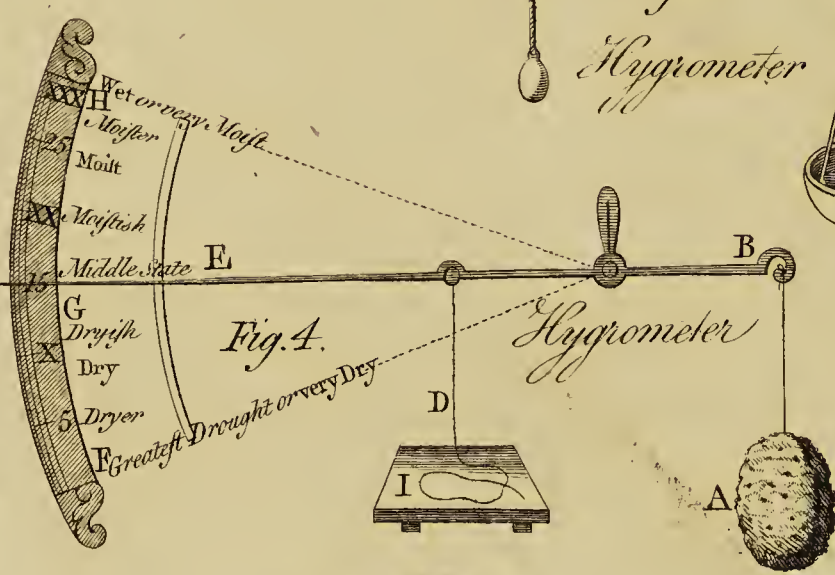
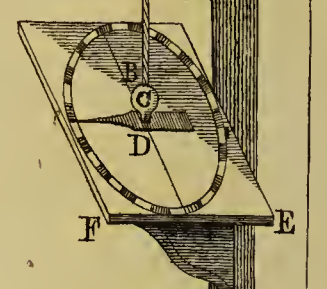
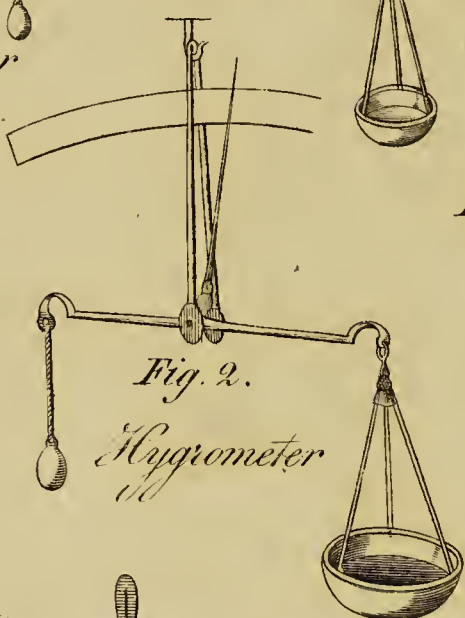
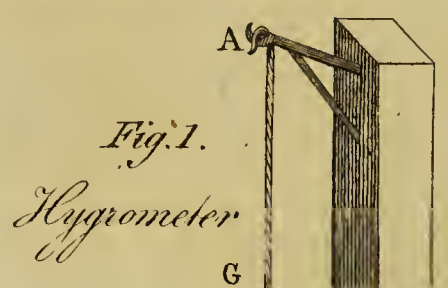
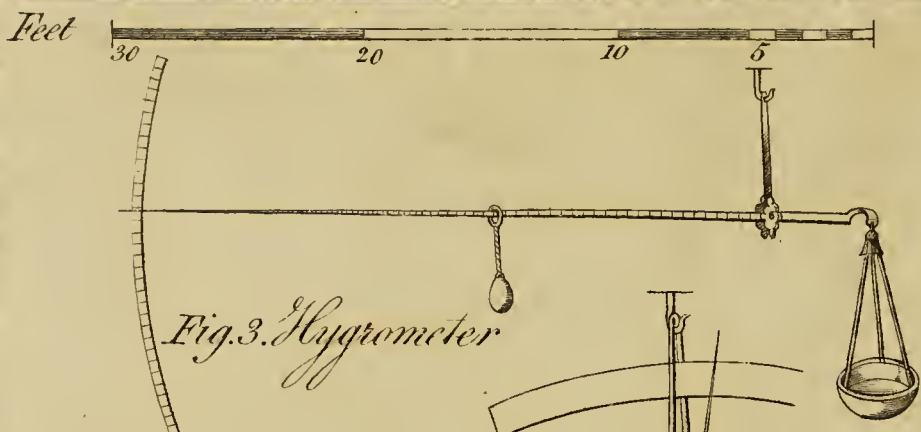
**HYDROMPHALUS**, in medicine and surgery, a tumour of the naval, containing water. See **HERNIA**.

**HYDROPARASTATE**, a sect of hereticks, the followers,











followers of Tatian. This sect was called also Encratitæ, Apotactitæ, Saccophori, Severiani, and Aquarians.

The Hydroparastatæ were a branch of the Manichees, whose distinguishing tenet was, that water should be used in the Eucharist instead of wine.

**HYDROPHOBIA**, in medicine, a dread of water, which is a symptom arising in a person who has been bitten by a mad dog, or other mad animal.

We have an account of remedies for this malady in the Philosophical Transactions; one of which is the lichen cinereus terrestris, or ash-coloured liverwort, which has been taken into the College Dispensatory, under the title of pulvis antilyssus, and is the celebrated remedy published by Dr. Mead, with some variation in the proportion of the pepper. The directions, as made publick, are, first to take away nine or ten ounces of blood; and then take of powdered ash-coloured liverwort four drams, and of the powder of black pepper, two drams: mix these together, and divide into four doses; one of which is to be taken fasting for four days successively, in half a pint of tepid cow's milk. After taking these four doses, the patient is to be put fasting every morning for a month, either into a cold bath, cold spring, or river, remaining therein, with his head above water, not longer than half a minute, if the water be excessively cold: then let him bathe thrice a week for fifteen days.

Boerhaave, in his Aphorisms, treating of the canine madness, would have us not to despair of discovering a peculiar antidote against this singular kind of poison: and this, says he, we are encouraged to hope for, from the certain instances we already have of remedies effectual against particular sorts of poison: accordingly, he had a mind to try what effect mercury would have upon animals under canine madness; and from several experiments, he found it prove successful, by administering some grains of turpeth mineral made into boluses. He also mentions the remedy which M. Default tried with constant success in the hydrophobia, which is a mercurial ointment made of one third part of mercury revived from cinnabar, one third part of human fat, and as much of hog's lard. One or two drams of this ointment at a time should be rubbed by intervals, or successively, upon and about the wound. As a further confirmation of the efficacy of mercury in the canine madness, he takes notice of a medicine Mr. Cobb, of Buffelton, near Bristol, brought from Tonquin, which is much celebrated in the E. Indies as efficacious in this distemper; this is a native and factitious cinnabar, of each 24 grains; musk 16 grains, powdered and mixed well together. This powder is to be taken all at once in a tea-cup of arrack, which is said to secure the patient for 30 days: after which time, the dose is to be repeated in the same manner; but it should be done as soon as possible after the bite is received: but if the patient have any symptoms of the disease, the second dose must be repeated three hours after the first; and this is said to be sufficient for a cure.

**HYDROPICK**, a dropical patient; or a person swelled and bloated with abundance of water. See the article **DROPSY**.

**HYDROPOTA**, in medicine, a person who drinks nothing but water. It has long been controverted among physicians, whether or no the hydropotæ live longer than other persons.

**HYDROPS**, in medicine, the same with dropsy. See **DROPSY**.

**HYDROSCOPE**, an instrument anciently used for the measuring of time. The hydroscope was a kind of water-clock, consisting of a cylindrical tube, conical at bottom; the cylinder was graduated, or marked out with divisions, to which the top of the water becoming successively contiguous, as it trickled out at the vertex of the cone, pointed out the hour.

**HYDROSTATICAL BALANCE**. See *Hydrostatical BALANCE*, and **HYDROMETER**.

**HYDROSTATICKS**, that part of mechanicks which considers the gravity and æquilibrium of fluid bodies, particularly water, and of solid bodies immersed therein. Mr. Boyle has applied hydrostaticks in ex-

perimenting and proving the goodness and purity of metals, minerals, &c. particularly fluids, in his *Hydrostatica*.

**HYGIEINE**, that branch of medicine which prescribes rules for the preservation of health; it may be divided into prophylactice, which foresees and prevents diseases; syneritice, employed in preserving health; and analeptice, whose office is to restore health.

**HYGROMETER**, or **HYGROSCOPE**, a machine whereby to measure the degrees of dryness or moisture of the air. In the Philosophical Transactions we have several methods of constructing hygrometers.

Mr. Molyncux gives the following: A B (*plate XLII. fig. 1.*) is a whiplcord about four feet long, tied fast to the end of the hook A. At the end of this whiplcord hangs the weight C, about a pound or something more: this weight is so fitted at the end as to receive and carry the index D. Under these there is placed a graduated circle on the board E F, fixed by a bracket against the wall.

The moisture of the air twists the rope, and gives a motion to the index over the divisions in the graduated circle; and again, as the air grows more dry, the cord untwists and brings back the index by a contrary motion. The rope A B shortens and lifts up the weight C by way of a screw, and consequently must give a circular motion to the index.

One of the grand defects of all hygrometers hitherto invented is that they grow weak with age, and do not so nicely obey the alterations of the air. The alterations also of the air may give this kind of hygroscope more than one turn. To remedy this, the index D has two complete turns; the point A, as being fixed, has no turn, therefore the middle point G has but one turn; and consequently if it be hung up at the point G, or no longer than G D, half the former length, the index D will have but one turn. What is here said of two turns, and the middle point G, may be accommodated to any other number of turns and points in the rope.

Mr. Gould observes, that when oil of vitriol is saturated in the moistest weather, it afterwards retains or loses its acquired weight, as the air proves more or less moist. Thus one grain, after its full increase, often varied the æquilibrium so sensibly, that the tongue of the balance of one inch and a half long described an arch of variation to one third of an inch compass; which arch would have been two inches two thirds, had the tongue been but one foot in length, even with that little quantity of liquor: so that, if more liquor expanded under a large surface be made use of, the minutest alteration of weather must needs very much more affect it; and a bare pair of scales will afford a hygroscope as nice, perhaps, as any yet known.

This balance may be contrived two ways, either such whose pin should be the middle of the beam (*fig. 2.*) with a very slender tapering tongue of a foot or a foot and a half long, pointing to the divisions on a broad arched plate fixed above in the handle; or else the scale with the liquor may be hung to a point of the beam (*fig. 3.*) very near the pin, and the other extreme made so long as to mark a large arch on a board placed conveniently for that purpose. The scale in either may be a concave glass of four or five inches diameter. Lastly on the division of the arches should be inscribed the different temperature of the air shewn by the liquor.

He thinks oil of sulphur per campanam, as also oil of tartar per deliquium, and the liquor of fixed nitre, &c. might succeed as well as oil of vitriol.

Another hygroscope, he says, may be made of a viol string running upon pulleys, and suspending a bullet fixed to the shorter end of an index, whose other extremity is so long as to describe a long arch, by the falling and rising of the bullet upon the stretching and shrinking of the string: which would be the more nice, were the index fastened to the centre of the last pulley.

But among all the inventions the following seems best calculated both for dispatch and accuracy:

A (*fig. 4.*) represents a thin piece of sponge, so cut as to contain as large a superficies as possible. This hangs by a fine thread of silk, upon the beam B, and is exactly balanced from another thread of silk at D, strung with the smallest lead shot, at equal distances, and so



adjusted as to cause the index E to point at G, in the middle of the graduated arch F, G, H, when the air is in a middle state between the greatest moisture and the greatest dryness. I, shews a little table or shelf for that part of the silk and shot, which is not suspended, to rest upon.

**HYMEN**, in anatomy, a membrane, sometimes of a circular, sometimes of a semilunar figure, and sometimes of a form different from both. It is always found in young girls, and stops a part of the vagina. In these it has a small aperture, and a longer in adults who have not conversed with men. After the first coitus it is not to be found: it is always destroyed by it; and if it has not been injured before, some blood follows the rupture of it.

In the heathen mythology, Hymen was the god of marriage, and new married women offered sacrifices to this deity. He was represented crowned with sweet marjoram, and sometimes with roses; carrying in one hand a torch, and in the other a flame-coloured veil, to represent the blushes of a virgin.

**HYMENÆAL**, something belonging to marriage, so called from hymen. The hymenæal song is otherwise called epithalamium.

**HYMN**, a religious song. The hymns sung in the Christian church, as distinguished from the Psalms, are pieces of poetry composed of pious, but not inspired authors.

**HYOIDES**, in anatomy, a forked bone at the root of the tongue; it is situated in the middle space between the angles of the lower jaw; it is a little bone, and resembles, in some measure, the basis of the lower jaw.

**HYOSCYAMUS**, henbane, in botany, a genus of plants, whose flower is monopetalous and funnel-shaped; the tube is cylindrical, and the corolla is erect and spreading, lightly divided into five obtuse segments, one being broader than the rest; it hath five tubulated filaments, topped with roundish antheræ. The fruit is an ovate obtuse capsule, with a line marked on each side; it contains two cells with numerous seeds. The common henbane, which grows wild on dunghills, &c. is of a very poisonous quality; it is therefore dangerous to use it internally, though its seeds have been recommended by some in a hæmoptosis and hæmorrhages; but great caution should be used in regard to the quantity prescribed.

**HYOTHYROIDES**, in anatomy, a muscle of the larynx, which serves to raise it, and constrict the glottis.

**HYPÆTHROS**, or **HYPETHRON**, in ancient architecture, a kind of temple open at the top.

**HYPALLAGE**, among grammarians, a species of hyperbaton, consisting in a mutual permutation of one case for another.

**HYPERBATON**, in grammar, a figurative construction inverting the natural and proper order of words and sentences. The several species of the hyperbaton are the anastrophe, the hysteron proteron, the hypallage, synchysis, tmesis, parenthesis, and the hyperbaton, strictly so called. See **ANASTROPHE**, &c.

**HYPERBATON**, strictly so called, is a long retention of the verb, which completes the sentence.

**HYPERBOLA**, in geometry, one of the curve lines formed by the section of a cone. See **CONICK SECTIONS**.

The plane of every hyperbola is proportioned by this general theorem:

“As the sum of the transverse and any abscissa, multiplied into that abscissa, is to the square of its semi-ordinate; so is the sum of the transverse and any other abscissa, multiplied into the abscissa, to the square of its semi-ordinate.”

To find the focus of any hyperbola. The focus being that point in the hyperbola's axis, through which the latus rectum must pass, as in the ellipsis and parabola, it may be found by this theorem:

“To the rectangle made of half the transverse into half the latus rectum, add the square of half the transverse; the square root of that sum will be the distance of the focus, from the centre of the hyperbola.”

To describe a hyperbola in plano. In order to the easy describing of an hyperbola in plano, it will be con-

venient to premise the following proposition, which differs from that of the ellipsis only in the signs.

**Prop.** If from the focus of any hyperbola there be drawn two right-lines, so as to meet each other in any point of the hyperbola's curve; the difference of those lines (in the ellipsis it is their sum) will be equal to the transverse diameter. If this proposition be truly understood, it must needs be easy to conceive how to describe the curve of any hyperbola very readily by points, when the transverse diameter and the focus are given, or any other data by which they may be found, as in the precedent rules.

**HYPERBOLA**, in rhetoric, a figure that represents things greater or smaller, better or worse, than in fact they are, in order to raise admiration or love, fear or contempt. Human nature is apt to magnify what it admires, to the height of wonder; and to sink, what it despises or hates, to the lowest degree of contempt.

**HYPERBOLICK**, or **HYPERBOLICAL**, something relating to an hyperbola.

**HYPERBOLICK Space**, in the higher geometry, the area or space contained between the curve of the hyperbola, the asymptote, and the ordinate.

**HYPERBOLICAL Conoid**, a solid generated by the rotation of an hyperbolical space about its transverse axis.

**HYPERBOLIFORM FIGURES**, are such curves as approach, in their properties, to the nature of the hyperbola, called also hyperboloides.

**HYPERCATALECTICK**, in the Greek and Latin poetry, is applied to a verse, which has one or two syllables too much, or beyond the regular and just measure. The Greek and Latin verses are distinguished, with respect to their measure, into four kinds, acatalectick, brachycatalectick, and hypercatalectick.

The hypercatalectick is also called the hypermeter.

**HYPERICUM**, St. John's-wort, in botany, a genus of plants, the flower of which consists of five oblong, obtuse, spreading petals: the stamina are composed of a great number of capillary filaments, coalescing at their base in three or five distinct bodies, and topped with small antheræ: the fruit is a roundish capsule, with two, three, or five cells, containing a great number of small seeds. The common St. John's-wort, which grows in many parts of England, has a woody perennial fibrous root; from which arise several round stalks, dividing into many branches; these are furnished at each joint with two small oblong leaves placed opposite, without pedicles: the flowers grow on the extremities of the branches in numbers together, of a bright yellow colour, and come out in June. The leaves and flowers of this species are used in medicine, and have been recommended of peculiar efficacy, in hysterical, hypochondriacal and melancholick disorders, and alienations of mind; from its supposed virtue in which cases, it received the name of *fuga dæmonum*. It promises to be of some use as a mild detergent and corroborant, discovering to the senses a resinous, bituminous, balsamick impregnation.

**HYPERMETER**, in the ancient poetry, the same with hypercatalectick. See **HYPERCATALECTICK**.

**HYPERSARCOSIS**, in medicine and surgery, an excess of flesh, or rather a fleshy excrescence, such as those generally arising upon the lips of wounds, &c. See **WOUND** and **EXCRESCENCE**.

**HYPERTHYRON**, in the ancient architecture, a sort of table used after the manner of a frieze, over the jambs of Dorick doors and gates, and the lintels of windows. It lies immediately under the corona, and our workmen usually call it the king-piece.

**HYPHEN**, a character in grammar, whereby two words are to be connected into a compound word, marked thus (-), as male-fanus, sine-cure, male-administration, &c. A hyphen also serves to connect the syllables of such words as are divided at the end of a line.

**HYPNOTICK**, **HYPNOTICA**, or **HYPNOPSIS**, in physick, are such medicines as procure sleep.

**HYPOBOLE**, in rhetoric, a figure whereby any objections that an adversary might make are anticipated and answered. An example of this we have from the 15th chapter of St. Paul's first epistle to the Corinthians; ‘But some will say, How are the dead raised up? and with



with what body do they come? Thou fool, that which thou slowest is not quickened, except it die, &c.'

**HYPOCATHARSIS**, in medicine, a slight purgation downwards, in contradistinction to hypercatharsis.

**HYPOCAUSTUM**, among the old Greeks and Romans, a place for bathing and sweating, which is heated by a fire under its floor; it generally signifies the place where the fire is kept that warms a stove or hot-house. Vitruvius calls it *caldarium*.

**HYPOCHONDRIA**, in anatomy, that part of the body, on both sides, which lies under the spurious ribs, and is extended to the ilia, comprizing not only the muscles, but the internal viscera.

**HYPOCHONDRIACK AFFECTION, PASSION, or DISEASE**, *Morbus Hypochondriacus*, vulgarly called the spleen, vapours, &c. in medicine, a disorder that principally exerts its tyranny under the ensiform cartilage and spurious ribs, in the region of the hypochondria.

This disease, so various in appearance, is chiefly owing to two causes, rest of body, and agitation of mind: by the former the humours are rendered too sluggish in their motions; and, by the latter, the blood at one time almost stagnates, and at another is driven on with excessive vehemence: and health must suffer in both cases.

This theory plainly points out the cure, which consists in purging off and correcting the humours. Yet the disease does not require strong catharticks; it is much safer to trust to the milder sort, such especially as attenuate the humours, and work by stool and urine at the same time. Of this kind are the deobstruent pills, aloeticks blended with saponaceous medicines, rhubarb, Glauber's salt, and the like.

The lentor and thickness of the humours are most conveniently removed by chalybeates, bitters and aromatics, especially in tinctures. And natural chalybeate waters are the most efficacious of all steel medicines.

In fine, all sorts of bodily exercise are necessary; and in particular it will be of great service to play at bowls or tennis, or toss the arms briskly to and fro with lead weights grasped in the hands; but nothing is better than riding daily on horseback.

**HYPOCYSTIS**, in pharmacy, an inspissated juice, nearly resembling the true Egyptian acacia. They gather the fruit, while unripe, and express the juice, which they evaporate over a very gentle fire, to the consistence of an extract, and then form into cakes, and expose them to the sun to dry.

Hypocystis is an astringent, and that of considerable power; it is good against diarrhoeas and hæmorrhages of all kinds, and may be used in repellent gargarisms, in the manner of the acacia; but it is very rarely met with genuine in our shops, the German acacia being usually sold under its name.

**HYPOGASTRICK**, an appellation given to the internal branch of the iliac artery.

**HYPOGASTRICK VEINS** arise on each side from the ilia, and send out branches to the rectum.

**HYPOGASTRIUM**, in anatomy, the lower part of the abdomen. See **ABDOMEN**.

**HYPOMOCHLION**, in mechanicks, the same with fulcrum.

**HYPOPYON**, in medicine, a collection of purulent matter under the corner of the eye. See **EYE**. As to the cure of an hypopyon, it should first be attempted by violently shaking the patient's head, in a supine posture, and pressing the eye before, with the fingers, in order to remove, or at least loosen the matter.

**HYPORCHEMA**, in the Greek poetry, a poem consisting of divers kinds of verse, and of different lengths; but always full of short or pyrrhichick feet.

**HYPOSTASIS**, among divines, signifies a person or substance; chiefly used in speaking of the persons of the Trinity. See **TRINITY**.

**HYPOSTASIS**, in medicine, denotes the sediment of urine.

**HYPOTHECA**, in the civil law, the same with mortgage in the common law. See **MORTGAGE**.

**HYPOTHENAR**, in anatomy, the abductor muscle of the little finger. See **ABDUCTOR**.

**HYPOTHENUSE, or HYPOTENUSE**, in geome-

try, the longest side of a right-angled triangle, which subtends the right angle. Thus in the right-angled triangle ABC (*plate XLIV. fig. 4.*) AC is the hypotenuse.

The word is Greek, and derived from *υπο*, under, and *τενω*, to extend.

The 47th prop. of Euclid's first book demonstrates that, in every rectilinear right-angled triangle, the square of the hypotenuse is equal to the squares of both the other sides. It is particularly called the Pythagorean theorem, from its invention by Pythagoras, who is said to have sacrificed a whole hecatomb to the muses, in gratitude for their assisting him in the discovery.

**HYPOTHESIS**, in general, denotes something supposed to be true, or taken for granted, in order to prove or illustrate a point in question.

An hypothesis is either probable or improbable, according as it accounts rationally or not for any phenomenon: of the former kind we may reckon the Copernican system and Huygens's hypothesis concerning the ring of Saturn; and the Ptolemaick system may be esteemed an instance of the latter. See **COPERNICAN**, &c.

Hypotheses, however elegant and artful, ought to be first proved by repeated observations and constant experience, before they are received as truths.

**HYPOTRACHELION**, in architecture, denotes a little frieze in the Tuscan and Dorick capitals, between the astragal annulets, called likewise colerin, gorgerin, &c. By some it is applied to the neck of any column, or that part of the capital below the astragal.

**HYPOTYPOSIS**, in rhetorick, signifies a lively description.

**HYPOZOMA**, in anatomy, a membrane that separates two cavities: such is the diaphragm.

**HYPSILOIDES**, in anatomy, the same with os hyoides. See **HYOIDES**.

**HYSSOP**, *Hyssopus*, in botany, a genus of plants, the flower of which is monopetalous and ringent, with a narrow cylindrical tube: the upper lip erect, roundish, and emarginated; the lower one divided into three short segments, the middle one of which is hollow and cordated: it hath no pericarpium; but the seeds, which are oval, and four in number, are placed in the bottom of the cup.

The common hyssop hath brittle branchy stalks, which are furnished with small lanceolated leaves, placed opposite, in pairs, of a darkish green colour. The flowers come out in July and August, and are of a blue colour, growing in spikes: the whole plant is perennial, and cultivated in gardens.

Hyssop has an acrid taste, and a strong aromatick smell: it strengthens the stomach, helps digestion, and, by its power of attenuating the viscous matter from the lungs, promotes expectoration, and is therefore good in moist asthmas. Its good effects in the stomach are of the same kind, depending on its attenuating and absterging the viscous phlegm lodged there, which impedes the discharge of its proper function. It is also good in diseases of the head. It is best taken in infusion, in the manner of tea, not made so strong as to be disagreeable to the palate, and often repeated. It is one of those few simples, of which there is a distilled water made that is good for any thing; there comes over with it so much of a warm essential oil, as not only prevents it from mothering and stinking, which most simple waters are subject to, but also makes it a good pectoral, and efficacious to all those purposes which the herb is given for in any other form.

Externally, hyssop is greatly recommended in bruises; the blackness settling under the eyes from blows, is carried off very readily by a cataplasm of the leaves, or only a little bundle of them sewed up in a linen rag, and applied to the part: and Ray gives us an account from Mr. Boyle, of a violent contusion of the thigh, from the kick of a horse, very happily cured by this herb, boiled as a cataplasm; he tells us, the violent pain was almost instantly removed, and the very mark and blackness taken off in a few hours.

**HYSTERICKS, or HYSTERICAL PASSION**, in medicine,



medicine, a spasmodico-convulsive affection of the nervous system, proceeding from the womb, sometimes called fits of the mother.

In the fit it will be proper to apply foetid things to the nose; such as assa foetida, preparations of castor, partridges' feathers burnt, &c. For women in child-bed, a girdle made of Russia leather, and bound pretty tight, is excellent. Likewise clysters made with roots and seeds of lovage, which are specificks, camomile-flowers, elder-flowers, veronica, the carminative seeds boiled in whey; to which may be added oil of elder, dill, or camomile. Externally, plaisters made of opopanax, bdellium, galbanum, sagapenum, and assa foetida, may be applied to the navel. Some greatly recommend fumigation for the uterus, of musk, civet, storak, and benjamin. Inwardly, the patient may take 30 or 40 drops of tincture of castor, in cold water; or, if she can swallow them, the following pills: take myrrh, sagapenum, opopanax, assa foetida, saffron, and the theriaca andromache, of each half a dram; adding sometimes six or eight grains of camphire and laudanum opiatum. From each scruple of this must ten pills be made, two of which are to be taken every hour, with a due quantity of water of camomile flowers.

Some hysterical disorders, according to Dr. Mead, observe the lunar phases, and partake of the nature of an epilepsy: they seldom require bleeding, and purging should be used with caution. Emeticks are of greater service, especially a little before the fit. In the fit, the doctor observes, the best medicines are those which repair the loss of spirits; as Russian castor, gum ammoniac, and salt of amber, in pills. Take gum ammoniac, two drams; Russian castor, one dram; salt of amber, half a dram; with a sufficient quantity of the Peruvian balsam: make this mass into small pills, and let the dose, which is one scruple, be repeated as occasion requires.

Out of the fit, he prescribes native cinnabar and wild valerian root as most proper for correcting the juices.

HYSTEROLOGY, *Hysterologia*, in rhetorick, a depraved manner of speaking, in which the natural order of things is inverted.

HYSTEROTOMOTOCY, *Hysterotomotocia*, in surgery, an operation whereby the birth or child is taken out of the uterus by Cæsarean section.

HYTH, HYTHE, HITH, a wharf or little port where goods are shipped and landed, such as Queenhyth in London, &c.























